Smithsonian

February 1989

Seeking Amazonia's medicinal plants as time runs out (p. 94)

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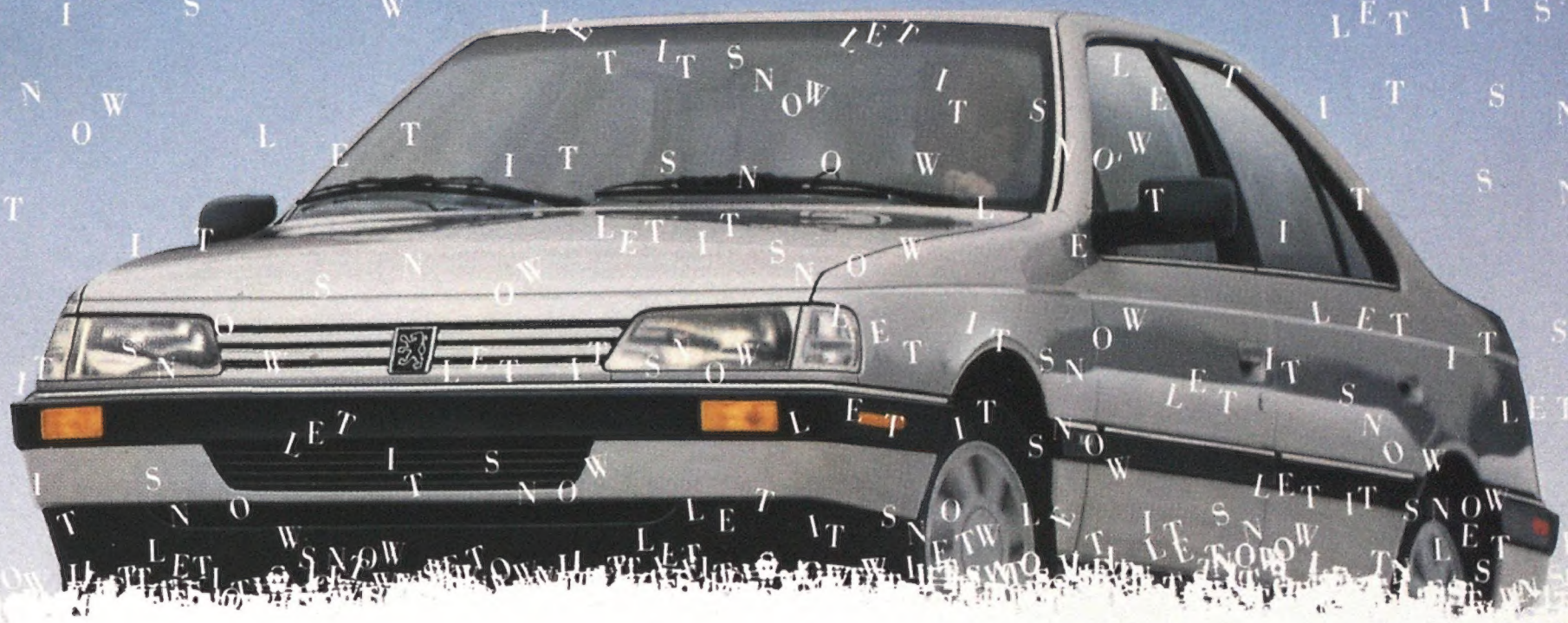

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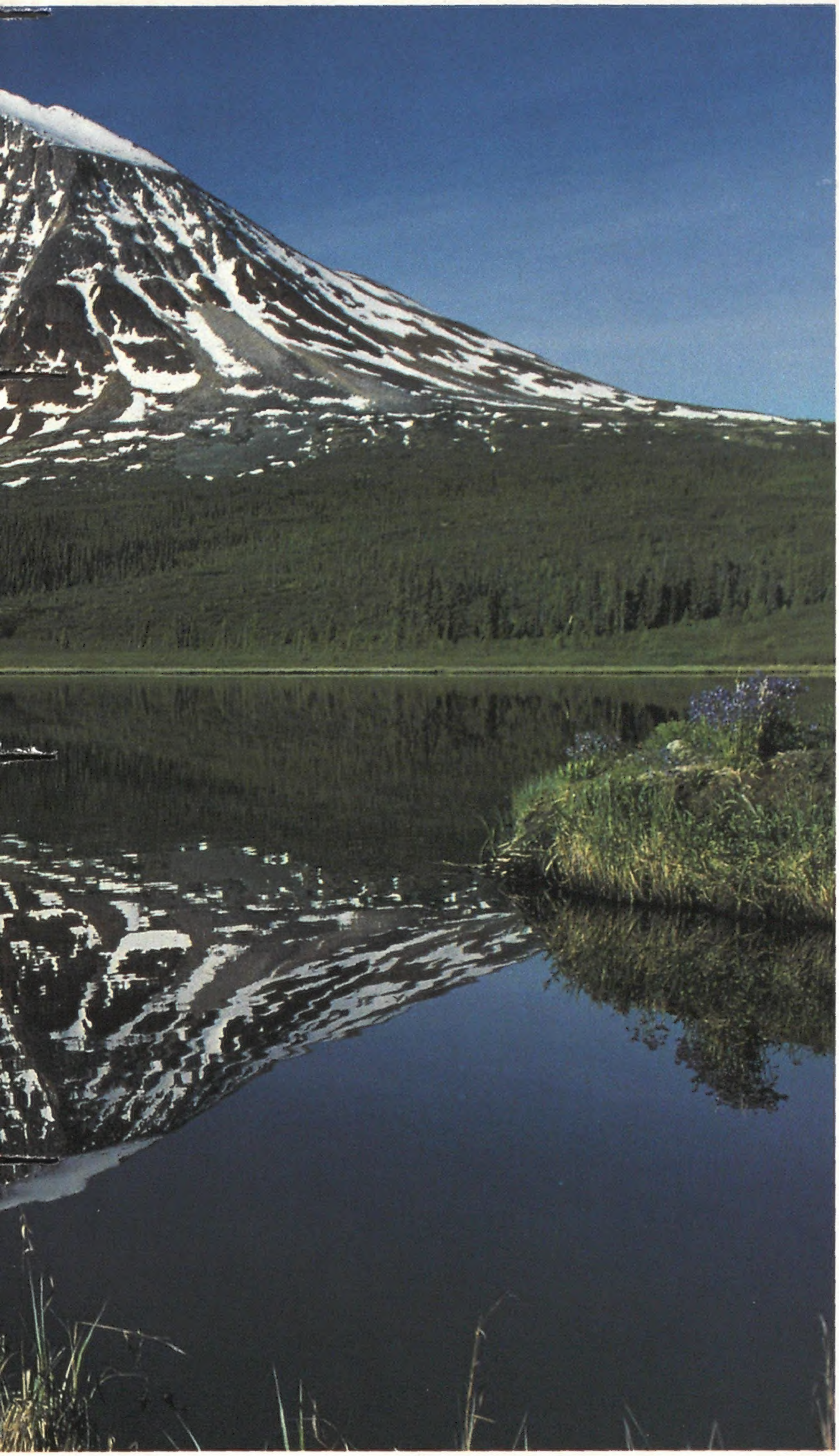

Photo by Pat and Rosemarie Keough.

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A look at life from a different perspective – the north's Dall sheep.

CANADA'S NORTHWEST TERRITORIES

Within reach, yet beyond belief

February 1989

Smithsonian

Volume 19, Number 11

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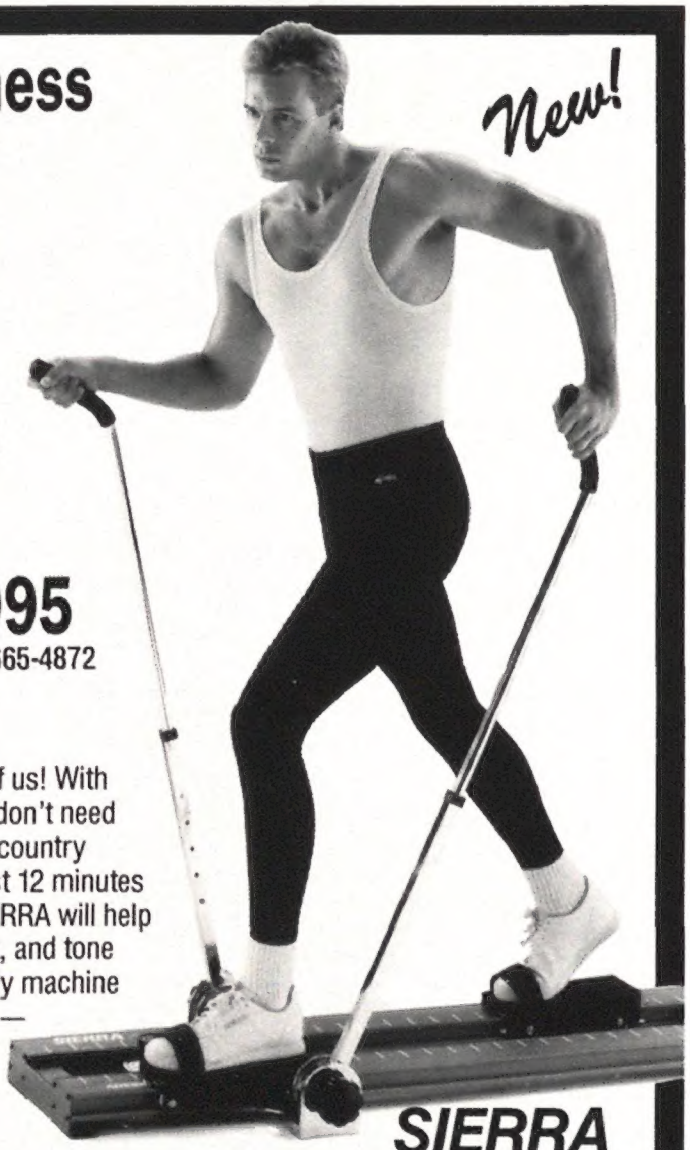

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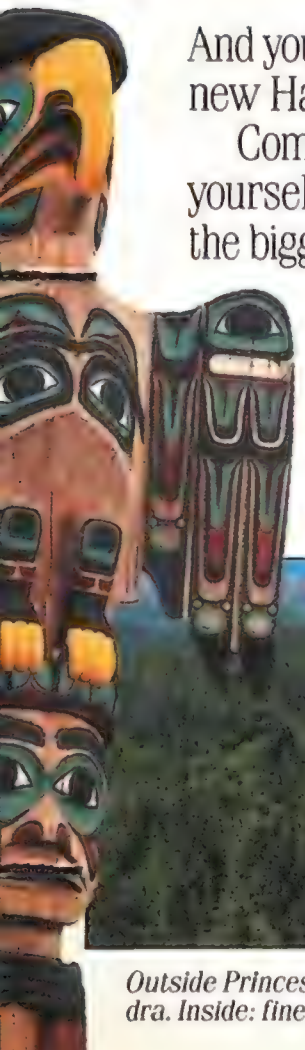

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Smithsonian horizons

When art is acquired primarily as an investment, will it not be subject to the vagaries of the stock market?

The explosive growth in the price of art is confronting museums all over America with a grave new challenge. Auction after auction in recent months has set new records, particularly for Impressionist and later works. What has been an almost unrestrained surge upward suggests not only a solidly unfolding revaluation of the art, but also a speculative bubble.

Perhaps it is not so surprising that artists whose paintings have withstood some considerable test of time—as those of Monet, van Gogh, Picasso and Degas surely have—should now command prices in the $10 million to $50 million range for individual works. But although some works of lesser quality failed to find buyers, not a few of those in question seem to have been distinguished more by their availability for purchase than by having been previously acclaimed as among the artists' finest. And living painters, too, are finding themselves in the painfully ironic role of mere bystanders as the resale prices of their works climb by hundreds or thousands of times within a span of only a few decades. When Andy Warhol's *Marilyn Monroe (Twenty Times)* (see page 62) brings almost $4 million at Sotheby's, who can deny that the rising tide is lifting all boats?

Most museums cannot compete in this frenzied bidding. With fixed or only slowly rising assets, their last year's projections often leave them sorely pressed even to meet the soaring costs of this year's insurance on loan exhibits. James Demetrion, director of the Smithsonian's Hirshhorn Museum and Sculpture Garden, must daily confront the dilemma of how, in view of these dramatic changes, to sustain Joseph Hirshhorn's original vision of a "living museum" devoted to the finest contemporary art of successively unfolding periods of time.

There is nothing very mysterious about most of the forces driving the art market upward—although there is also nothing to prepare us for the rapidity and magnitude of the increases. To begin with, the supply of what will be recognized as first-rate art is limited (although not unchanging, nor wholly inelastic in quantity). In spite of all the long-term problems associated with our nation's deficit, productive forces in this and many other countries are continuing to generate immense disposable wealth in corporate and individual hands. But at the same time, the stock market has failed to regain broad-based investor confidence; precious metals have lost considerable ground through the 1980s; bonds drift downward; and the weakness of the dollar creates at least a relative bargain for Japanese and European collectors.

In these circumstances, art increasingly comes to be perceived not only as an assured symbol of status but as a safely appreciating investment. Perhaps we also need to allow for an element of competitive display that is increasingly conspicuous—the interplay of strongly entrepreneurial egos in the new venue of the auction houses, with the aggressiveness of the bidding taking on something of the flavor of leveraged corporate buyouts.

What else besides art has such liquidity and established value? Nothing comes to mind, save possibly exotic real estate.

Further compounding the difficulties of museums are the effects of the Economic Recovery Tax Act of 1981 and the Tax Reform Act of 1986. As the recent report of the President's Committee on the Arts and the Humanities observes, "Increases in the price of giving as a result of reduced tax rates diminish incentives to give, even though personal income may increase." Moreover, prior to the 1986 Act gifts of substantially appreciated assets like art were for the most part subject to a full fair-market-value deduction from income. Now this is complicated by the new provision that gifts of appreciated property may trigger for the donor the alternative minimum tax, reducing even further the value of the charitable deduction. The total impact of these changes on museums and other charitable institutions cannot yet be accurately measured, but some of the reported trends are, to say the least, disquieting.

The awesome upward surge of market prices and the changes in tax incentives reinforce one another, in other words. Together they act to restrict a growing segment of modern and contemporary art to private holdings, where it is carefully insulated from public access (as provided by public museums) precisely by reason of its supposedly appreciating value. Query: Will the price of art continue to rise irresistibly even if museums and the public are forced into the position of marginal onlookers? If art comes to be acquired on investment criteria and not for its intrinsic qualities, what will prevent it from eventually suffering the vagaries of all other kinds of investments?

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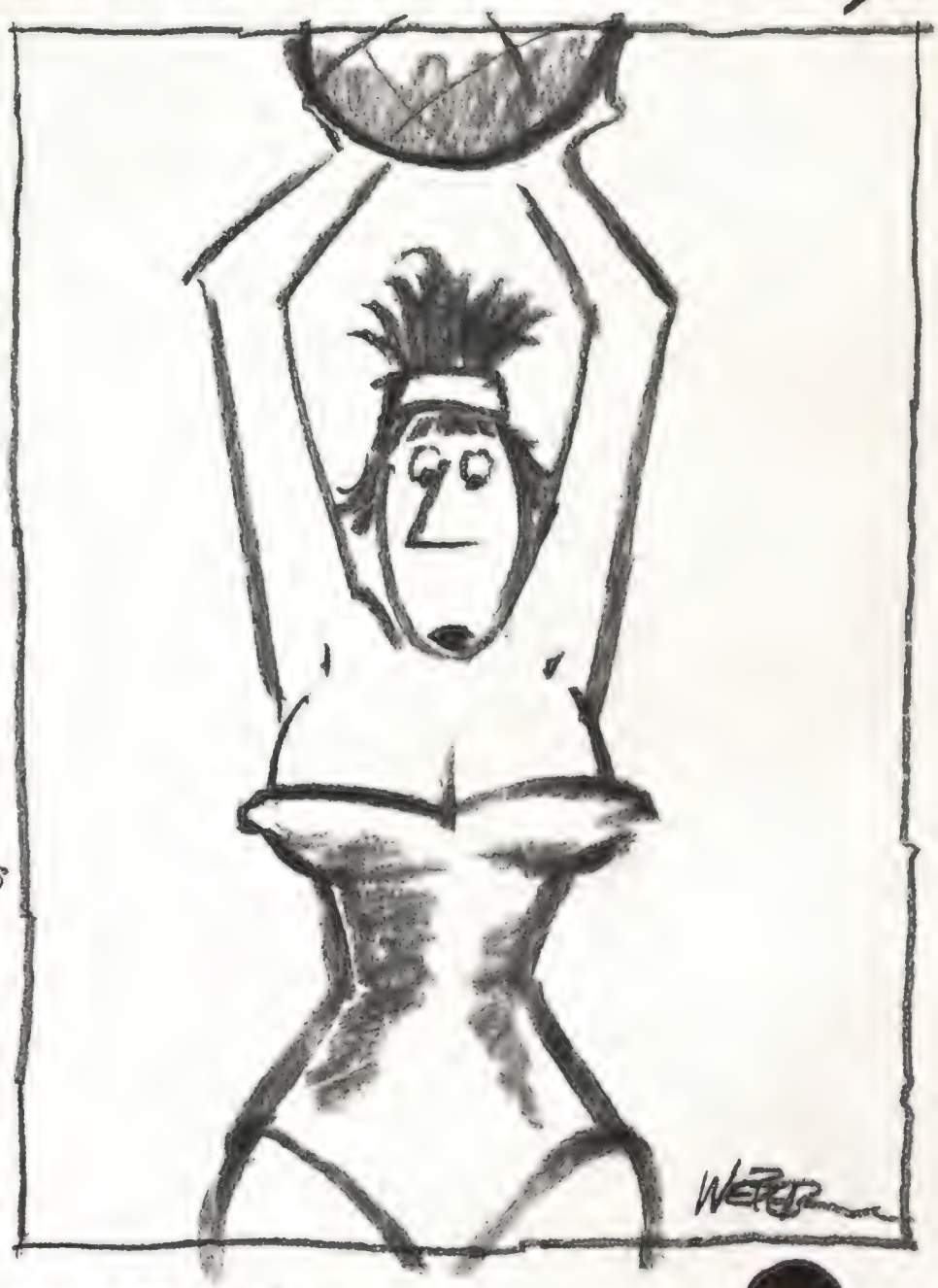

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Letters to the Editor

Man Ray

Dear Sir: *Le Violon d'Ingres*, Man Ray's famous photo of his mistress with superimposed S-curves, on page 65 of your December issue, is actually a witty pun. Ingres was both the leading portrait painter of his time *and* an accomplished violinist. That's why the title phrase is a French colloquialism for "hobby."
H. F. Lippincott
Montgomery, Alabama

Model trains

Dear Sir: As a practicing "ferroequinologist" (for the uninitiated, a student of the iron horse), your December cover got my immediate and full attention.

After 40-plus years of avid railroad involvement, my hobby is my escape from reality. My wife has often been asked: "Doesn't it bother you that he is in the basement, playing with trains?" Her response: "At least I know where he is!"

Mr. Doherty failed to mention the control you have with model trains. When you want them to go, they go; when you want them to stop, they stop. Such control in real life is unheard of. I know; I have four daughters and a dog.
Charles A. (Chip) Rogers jr.
Athens, Ohio

Dear Sir: I endured a 22-year marriage to a basement dweller whose only passion was perfecting his train equipment and scenery, disregarding everything else outside and inside the house (except for his 9-to-5 job). It was a solid reason for divorce.
Helga Newcomb
Washington, New Jersey

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Dear Sir: The Santa Fe's Warbonnet design, pictured on your cover, was for passenger service only; freight locomotives were solid blue with yellow letters. Consequently, I admit somewhat amused outrage on seeing the cheap "starter" HO sets sold in toy stores invariably featuring the Warbonnet pulling a bunch of boxcars.

J. F. Mitchell
Richardson, Texas

Dear Sir: Now wait just a cotton-pickin' minute! How can you get nostalgia and romance from a little electric motor running around a tabletop? Has Jim Doherty sat on the tender of a coal-fired 8-foot-long Northern 4-8-4, weighing over 2,000 pounds, doing 20 miles per hour on a 7½-inch-gauge track, with his hand on the throttle, smoke and steam blowing back in his face? Not to mention going across a bridge that is 12 feet above the ground! That is nostalgia and romance—the smell, the sounds and the realism of the live-steam model railroad.

Go ahead! Buy your little engine with computer sound and with the TV camera in it to get your "realism"! Go ahead! Spend thousands of dollars and live in a basement! I would much rather spend the same money for a 1½-inch-scale locomotive and ride it out under the trees. Fake snow? We are thinking about building a *real* snowplow for our *real* snow!

Fred Lester
Springfield, Missouri

Dear Sir: I started more than 60 years ago with Lionel tinplate, graduated to modeling in HO, then into live-steam models. I am now a volunteer on the Berkshire Scenic Railway operating between Lenox and Great Barrington, Massachusetts.

My wife and I trained as train attendants; then I qualified as brakeman. I couple and uncouple cars, throw track switches, lubricate car journals. I ride the diesel locomotive—what a great feeling, especially when we go by a grade crossing with the whistle blowing, the warning lights flashing, the bell ringing. In my 70th year I have reached the peak: NOW I AM PLAYING WITH REAL TRAINS!

Richard L. Seidman
Ancramdale, New York

Dear Sir: There seems to be some confusion, in your caption on page 36,

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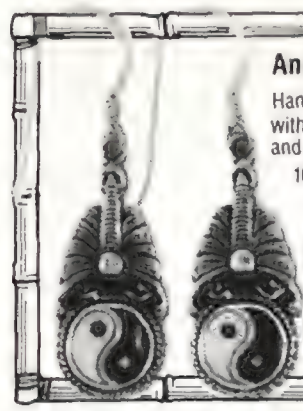

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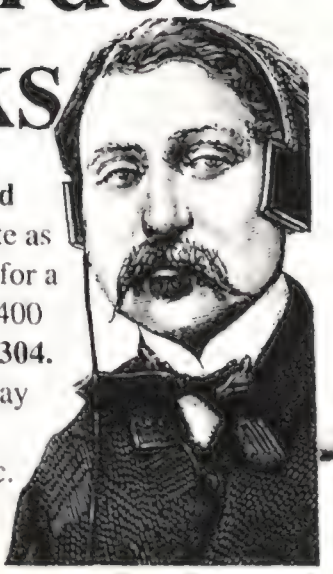

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Since 1986 the trains have been made in Mount Clemens, Michigan, by Dick Kughn's privately owned company, Lionel Trains Inc., under a continuing license from our corporation. Still headquartered in New York City, we operate 90 toy supermarkets in 17 states and are one of Lionel Trains Inc.'s biggest customers.

George A. Padgett
Senior Vice President
The Lionel Corporation
New York City

Brooklyn

Dear Sir: Your photo essay distorted and demeaned the image of Brooklyn and Brooklynites. The pictures you published show none of Brooklyn's beauty—its cultural and ethnic accomplishments, from the wonders of the Verrazano Bridge to the Fulton Street malls to the Botanical Garden to its citizens of golden age on a park bench. The restaurants on Third Avenue, the Feast of Santa Rosalia on 18th Avenue, the block parties, our beautiful churches, Sunset Park.

Ben Vien
Brooklyn

Khyber Pass

Dear Sir: In November 1967, my good friend Bill Krna and I drove my 1967 VW sedan east out of Ankara. Eventually, we negotiated the Khyber Pass, where I had a few memorable moments behind the wheel while winding down its eastern side. The border between Afghanistan and Pakistan is at the top and is the dividing line between "left-hand drive" and "right-hand drive." The road was narrow, and as today, the centerline was not marked. Hence, one tended to drive in the middle. The three-pointed star on top of the radiator of a Mercedes diesel semi was a pretty impressive sight from the vantage point of a VW driver. There were moments of abject terror as we careened down the road in our overloaded car, meeting those road giants on blind curves on the "wrong" side of the road. Obviously, we lived to tell the tale, but only because God or Allah has a penchant for helping fools.

F. Donald Wilson
New River, Arizona

Dear Sir: Rob Schultheis describes the region's 377,000 inhabitants as living in a terrain that receives "only 14 inches of rain a year," and suggests that if such desolate land existed in the United States it would be "virtually uninhabited."

This was of interest to the 400,000 or so of us who live in Albuquerque. Since the Spanish founded our modest little community in 1706 we have been doing fine, thank you, on about 8 inches of annual rainfall. Some years less. We question how the Pathan tribesmen manage to live in such a "rain forest."

David H. Morrissey
Albuquerque, New Mexico

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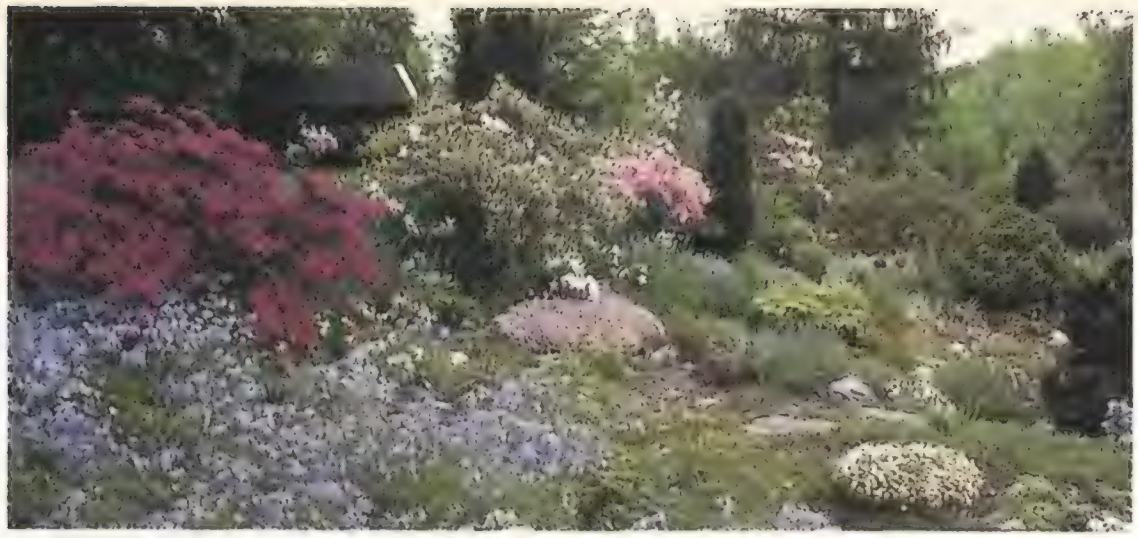

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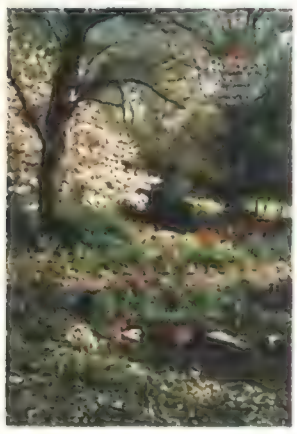

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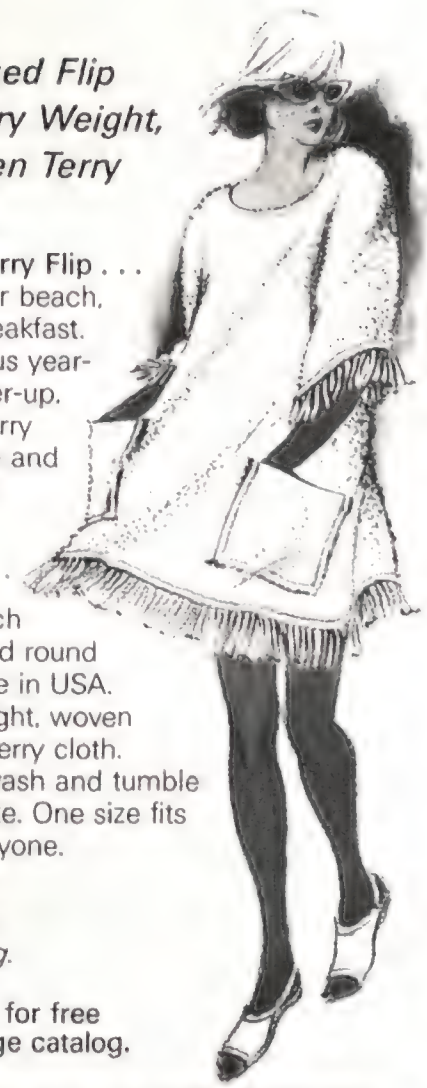

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Civil defense

Dear Sir: In Southern California, wartime preparedness was under way for at least a year before December 7, 1941.

My mother underwent many months of training as a plane-and-submarine spotter at the command station atop the Hall of Records in downtown Los Angeles. Its roof and those of other tall buildings were heavily camouflaged with fake trees and grass shacks. I distinctly remember a "family night" when my father and I were allowed to view this center of activity, quite a while before December 7.

On the morning of December 7 the phone alerted my father, who called Mother. Fifteen minutes later she emerged from the bedroom fully dressed, carrying an overnight bag that had been standing packed and ready for months. There were hugs and kisses and Mama went off to save Los Angeles.

Blackout practice had been going on for a long, long time. That night we knew it wasn't a "practice alert" but the real thing. The sirens came on sometime between 6:30 and 7, and from our hilltop vantage point we watched the lights of Los Angeles blink out and the searchlights on the coast come on, illuminating the ghostly barrage balloons that had been tethered in place for quite some time.

While mothers did a variety of volunteer war work and fathers volunteered for any branch of the service that would accept them, children collected coffee cans full of bacon grease and chicken fat, tin cans, aluminum pots and pans, and badgered all the grown-up ladies we knew for their old girdles. We saved our pennies to buy ten-cent War Stamps and when enough stamp books were filled the Army would send a couple of soldiers to our school and we all got a ride in a Jeep around the grounds.

Carol Nahin
Long Beach, California

Dear Sir: While serving with the 7827 Military Intelligence Company in U.S.-occupied Germany during 1948, I met George Dasch, German saboteur. Returned to Germany by order of President Truman, he was imprisoned in the Ludwigsburg Retention Center.

I found him to be a lonely man, scorned by the Germans. He related to

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me their plans to blow up, besides war-production plants, civilian targets such as the Pennsylvania stations in New York City and Newark, New Jersey.

Although he did not indicate any regret for his part in Operation Pastorius, he was an avid fan of the New York Giants and requested baseball scores on an almost-daily basis.

Michael A. Halczli
West Paterson, New Jersey

Yawns

Dear Sir: In regard to Israel Shenker's comment that herbivores don't yawn, nonsense, says my pet rabbit.

Mr. Tops has been yawning quite successfully since I got him. The preferred method is a gradual elongation of his body, comparable in a human to standing on tiptoes, with a stretching of his stomach muscles. At the height of the yawn, his back is forcibly arched, and it is almost the only time all the rabbit's teeth are visible. He seems to enjoy it.

Alex Stevens
Houston, Texas

Dear Sir: I must take issue with your statement that herbivores don't yawn. Witness the horse. Prior to a yawn a horse begins chewing-like motions, with maybe a few trial runs at opening the mouth. Once warmed up, the horse stretches its head and neck out, opens its mouth wide, rolls its eyes back in its head and closes them, and usually yawns several times in a row. Afterward it looks completely satisfied and a little sleepy. Having watched a horse yawn, it is nearly impossible *not* to follow suit.

Nancy Maxeiner
Potlatch, Idaho

Veterinarians tell us that horses do yawn, but the activity Alex Stevens has observed in his rabbit is a continuation of stretching. Ed.

Lawrence Halprin

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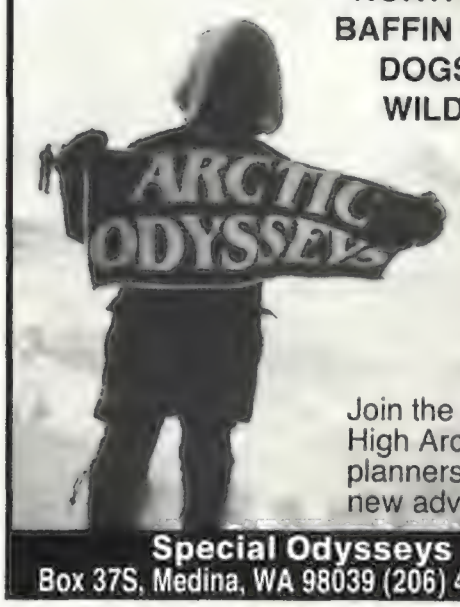

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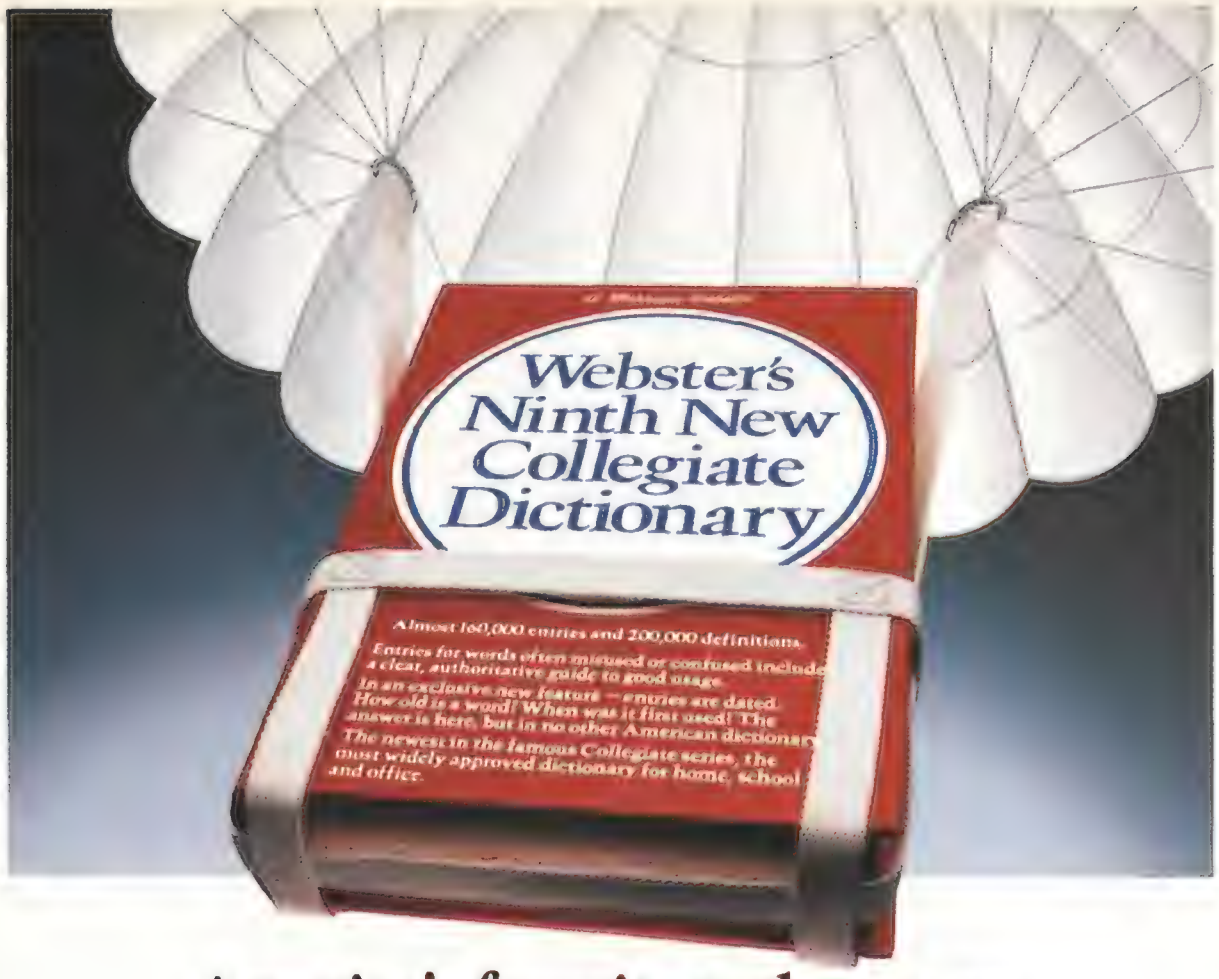
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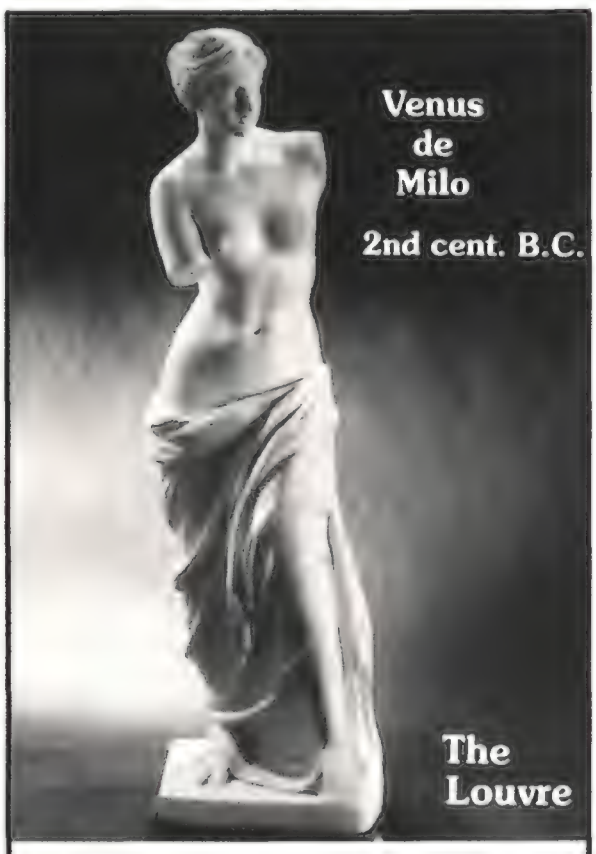

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The following letter was dated November 6, 1940, and mailed from Santiago de Cuba:

Mr. Franklin Roosvelt,
President of the United States.

My good friend Roosvelt:
I don't know very English, but I know as much as write to you.
I like to hear the radio, and I am very happy, because I heard in it, that you will be President for a new (periodo)
I am twelve years old. I am a boy but I think very much but I do not think that I am writting to the President of the United States.
If you like, give me a ten dollars bill green american, in the letter, because never, I have not seen a ten dollars bill green american and I would like to have one of them.
My address is:
Sr. Fidel Castro
Colegio de Dolores
Santiago de Cuba
Oriente. Cuba.
I don't know very English but I know very much Spanish and I suppose you don't know very Spanish but you know very English because you are American but I am not American.
(Thank you very much)
Good by. Your friend,
Fidel Castro

The future Premier of Cuba got an acknowledgment, but no ten bucks. Pity. Might have changed the political profile of the Western Hemisphere.

This letter will go on display early next month at the National Archives, our neighbor across the Mall. It's one of 103 items—letters, petitions, photo-

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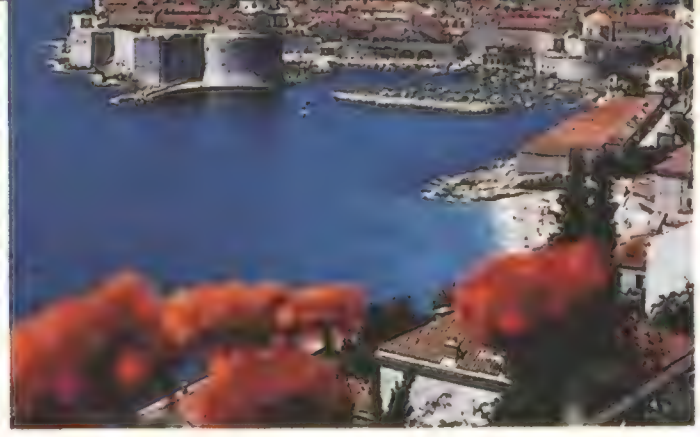

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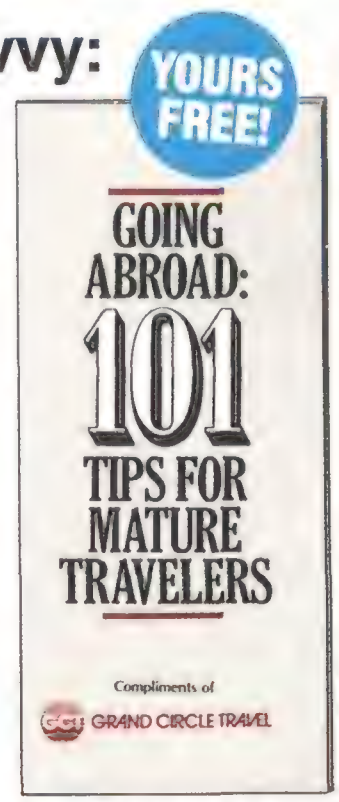

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Appleseed's COLLECTION

graphs, drawings, etc.—that the Archives people chose for their new exhibit called "American Voices: 200 Years of Speaking Out." The display will commemorate the 200th anniversary of the establishment of the federal government and will be on view for a year. The idea is to prove that Americans are an outspoken breed, and that their right to petition is alive and well. More broadly, the exhibit emphasizes our government's openness to a wide variety of communications—even, as above, from a 12-year-old boy from Cuba.

If you know your Bill of Rights off the top of your head (I had to look it up), you'll remember that the right to petition is in the First Amendment, along with freedom of religion, of speech, of the press and of assembly. And Americans have enthusiastically petitioned all three branches of our government for more than 200 years. This sampling comes primarily from the collections of the Archives.

"The oldest item we show," said Stacey Bredhoff, curator of the exhibit, "is a letter from Jonathan Trumbull, the royal governor of Connecticut, to the Earl of Dartmouth, protesting the closing of the port of Boston. You remember, that was how the British government got back at Boston for its Tea Party. The governor didn't think it was fair to punish the entire town of Boston for this escapade."

Among the most recent petitions is a collection of short pieces of lumber—two-by-fours—each bearing a message to President Carter. The idea was to remind him, graphically, that the housing industry was taking it on the chin because of high interest rates. "Please re-read your 1976 campaign speeches," reads one of these. "It's amazing how much you've forgotten in 4 short years."

Another petition, dramatic for its size, consists of hundreds of sheets of paper pasted together and wrapped around two wooden spools almost seven feet high. They carry the signatures of people who, in the late 1800s, were asking for a federal roads department.

"That's one of our largest petitions," Bredhoff told me. "It certainly caught the attention of Congress, and helped create an Office of Road Inquiry within the Department of Agriculture. But this sailor, in 1811, got nowhere with his petition to Congress for a divorce."

She showed it to me. The seaman lived in Alexandria, Virginia, which, back then, was a part of the District of

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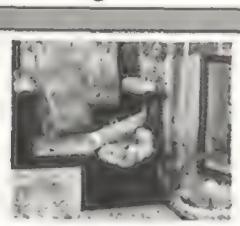

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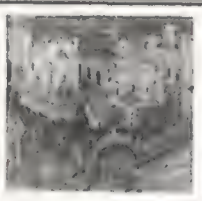

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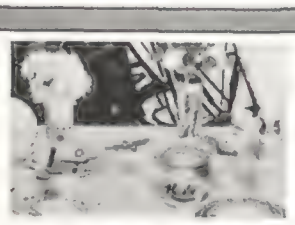

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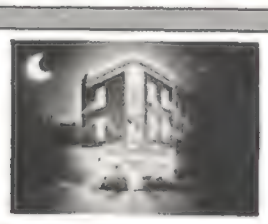

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Detailed drawing accompanied Sangster and Seely's 1865 petition for "Improvement In Bows for the Neck."

Columbia. That's why he addressed his petition to Congress after he returned from a voyage and found his wife had been playing around.

"Congress turned him down," said Bredhoff. "They felt that because of the separation of church and state, it was beyond their authority to break the bonds of marriage."

Other individuals came up with telling appeals. One came from a slave, suddenly and bewilderingly emancipated, who heard that she could do what she wanted, yet was checked by her former owners. This letter was addressed to Abraham Lincoln:

> It is my Desire to be free. to go to see my people on the eastern shore. my mistress won't let me you will please let me know if we are free. and what i can do. I write to you for advice. please send me word this week. or as soon as possible. . . .

It's signed Annie Davis, from Bel Air, Maryland. Bredhoff says there is no record of a response.

In 1885 President Cleveland got a letter from Buffalo Bill's Wild West Show, carefully written in a trained hand. It begins, "To my Great Father," and it asks for improvements in Indian reservations—more opportunities for trade, better living conditions. The signature at the end is printed as neatly as that of a fourth-grader looking for good marks: Sitting Bull.

Bredhoff reminded me that patents for new inventions were obtained by petition. The show has several, including one dated 1879 from a young man named Thomas A. Edison, seeking a patent for "an improvement in electric lamps." That one paid off. But I doubt if the paper bow ties invented by James Sangster and Oran W. Seely shook the earth, even though the 1865 petition (above) contained meticulous instructions on how to fold and tie them.

These communications closely reflect the times that inspired them. In 1899, a brave black man from Arkansas wrote to President McKinley describing a vicious lynching of "20 colored men" and naming the leaders of the mob:

> After they killed the men, the mob forced their wives and daughters to yield to their beastly desires, then beat them and some of them died from the effect of the cruel treatment.
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"We don't have any evidence of an answer or a follow-up investigation," said Bredhoff, which leaves the disturbing thought of this outraged citizen having to live on in fear.

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"The risk increases with the sales until he is caught, or the responsibility alone puts him out of business."

Congress turned this down, evidently preferring to repeal Prohibition entirely.

Perhaps the most sobering display is the petition to President Truman of July 17, 1945, describing the effects of the "liberation of atomic power which . . . places in your hands, as Commander-in-Chief, the fateful decision" of using atomic bombs against Japan.

There were 12 copies of this document, each signed by a group of noted atomic scientists. All were concerned about the use of atomic power and warned that "a nation which sets the precedent of using these newly liberated forces of nature may have to bear the responsibility of opening the door to an era of devastation on an unimaginable scale . . . . the cities of the United States as well as the cities of other nations will be in continuous danger of sudden annihilation."

Here is documentation of a watershed: the end of the preatomic age; the start of something else that we're not quite sure of yet.

My favorite letter is from Anthony Ferreira of the H. B. Milnes School of Fair Lawn, New Jersey, written in 1974 in very large printing. It consists of one short sentence: "Dear President Ford, I think you are half Right and half wrong." That seems as good a political summary as you're apt to get.

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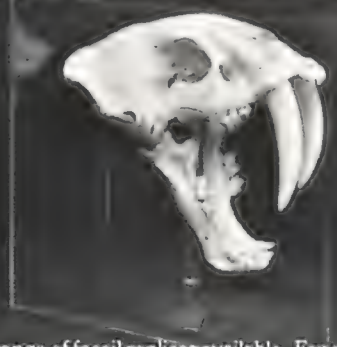

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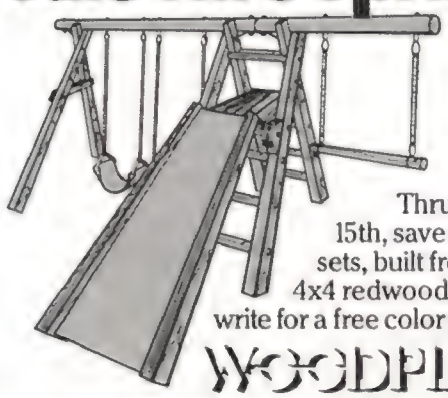

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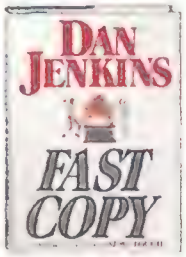

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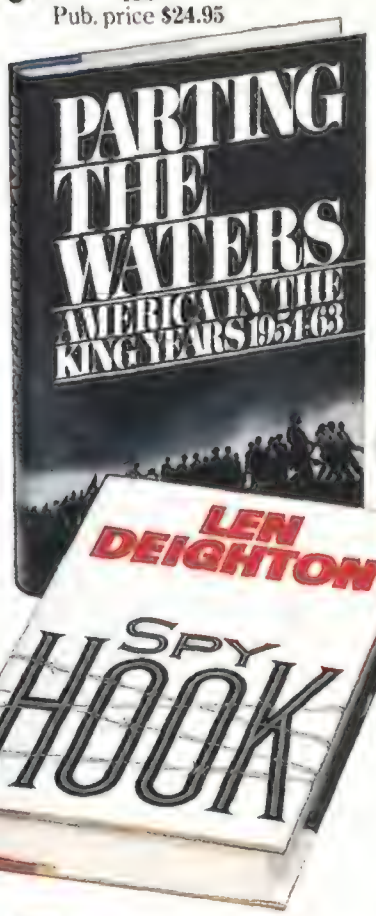

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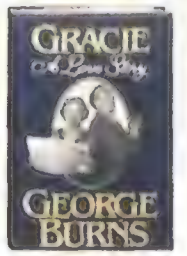

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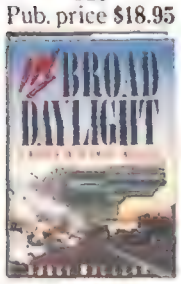

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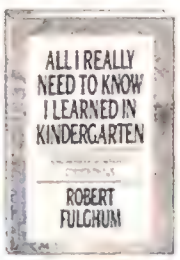

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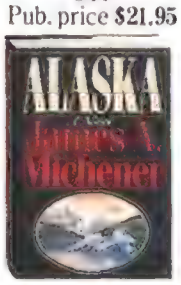

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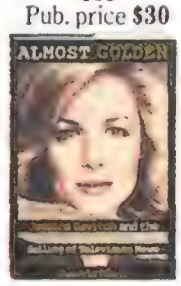

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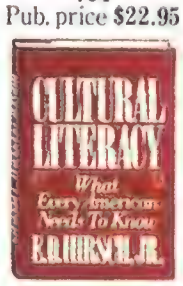

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Phenomena, comment and notes

An expert suggests that humans found animals lovable before they became useful—and made civilization possible

I know it is winter because of my cat, a Blue Burmese. He tells me in a simple and direct way: a gentle paw pokes me on the nose until I lift the quilt and admit him to the warmth of my bed. The behavior is efficient, effective and learned. For me the wonder lies in that we have brought a once-wild animal to the stage in which it not only inhabits our houses but can demand bed space.

My cat has started me thinking of the long relationship between humankind and the beasts that share our lives. As a zoo director, I never cease to be flattered that nondomestic animals recognize me. That they recognize me with affection, for want of a better word, is more subtly ego-building than much of the overt flattery of fellow humans. When one of the maned wolves, those gloriously beautiful dogs, comes bounding over the grass from 200 or 300 feet away at the sound of my voice, I feel an indescribable thrill. Somehow the "blood, toil, tears and sweat" of life slip away in those magical moments of interspecies play that I can indulge in when no one is around.

Even more conspicuously rewarding is the response of our subadult male orangutan, Azy, who will pick me out of a crowd of 50 on a Saturday morning and come over to the glass to offer me a mouthful of regurgitated food. How does he recognize me, and why? Azy's response has to be visual because a thick pane of glass separates us, my odor cannot reach him and I do not talk loud enough for my voice to penetrate the glass. We can eliminate a possible response to apparel. My body, from Azy's point of view, appears in a wide variety of colors and shapes, from sweatshirt to jacket to globular trenchcoat. Is it my movements or some indefinable gestalt?

When comparative psychologists study animals to see what they can be taught, they commonly use rewards of food, drink and heat as well as a variety of aversive stimuli. Some of the really complex things that animals learn, however, are reinforced much more powerfully by the rewards of social contacts, play opportunities and chances to explore novel situations. Consider my dog, Bruno, a highly strung Panamanian Garbagehound (a nonpedigree animal close to the essence of dogness). She recognizes some cues that seem incredibly complex until we realize how powerful a reward can be. Once she was left with friends who minded my house for a whole year while I was away doing research in New Guinea. Because they had a baby, Bruno was banished from the house. On my return a year later, she was ecstatic at being readmitted indoors; did she really recognize me, or was it simply joy at being allowed access to treasures of her youth? I tried a simple test. Panama is often hot and sunny, so before I took her for walks I always put on my hat. What would happen after a year's absence if I put my hat on in the house? The results were unequivocal. She leapt vertically in the air, yelping madly and licking my face every time her prodigious jumping brought her in range. The memory that "hat on head in house" meant the reward of a walk had persisted for more than a year of dog's days.

My relationships with a variety of animals are all well and good, but the much larger question is how it all started. Long before written history, humans drew, painted and carved. These unwritten pages of history have nature writ large upon them. The caves of southern France and northern Spain are full of wonderful depictions of animals. Early African petroglyphs depict recognizable mammals and so does much American Indian art. Carvings of mammoth ivory from Siberia represent animals as well as female humans.

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tiles, birds and mammals. I have in my office reproductions of Bast, the cat, and Horus, the falcon. Egyptian cat statues portray a lean, muscular, sinewy, incredibly graceful animal that is the essence of predatory perfection. To my admittedly prejudiced eye, dogs are handsome but cats are beautiful, the contrast between Hercules and Aphrodite. Present-day cats of the breed known as Abyssinian (right) resemble those statues of Bast. I have lived with Abyssinian cats and found them preeminently noble and full of grace.

Long before even art, before the misty morning of history, we have evidence of the closeness of humans and animals. The bones of dogs lie next to those of humans in the excavated villages of northern Israel and elsewhere. This unity in death is terribly appropriate. It marks a relationship that is the most ancient of all, one that dates at least to the Mesolithic. Twelve thousand years is probably the minimum age of this friendship. With the dog, the hunter acquired a companion and ally very early on, before agriculture, long before horses and the noble cat. The companion animals were followed by food animals and then by those that provided enhanced speed and range, and those that worked for us. Dogs, goats, sheep, pigs, cattle, horses and cats, perhaps in something close to that order, are the stars. Many were called but few were chosen. How did it all come about?

The answers involve process and preadaptation, the hows and the whys. By process I mean simply *how* animals came into the fold of human affairs, how wolves became dogs and so on. By preadaptation I refer to whether any species characteristics stacked the deck in the direction of the chosen few. This question concerns *why*, for instance, it was the dog that became Man's hunting companion and not the cheetah.

With inexorable post hoc logic, always a temptation and seldom wise, we can define the required characteristics of domesticable species. In doing so we would almost certainly exclude some of the nominees that were finally elected. Who, for example, would have predicted the domestication of the Peruvian cavy, or guinea pig, a small, excitable, noisy rodent that supplies Andean peoples 18,000 *tons* of meat a year?

On the other hand, a dog of some kind was almost inevitable. Consider its essence: a social carnivore, hunting larger animals across the broad plains it

These Abyssinian kittens look very much like the Egyptian cat god, Bast.

shared with our ancestors. Because of its pack structure it is susceptible to domination by, and attachment to, a pack leader—the top dog. Its young are born into the world dependent, rearable without too much skill, and best of all they form bonds with the rearers. Dogs have a set of appeasement behaviors that elicit affective reactions from even the most hardened and unsophisticated humans. Puppies share with human babies the power to transform cynics into cooing softies. Furthermore, the animal has senses of smell and hearing several times more acute than our own, great advantages to a hunting companion and intrusion detector. The dog's den-defense behavior makes it an instinctive guard animal. Finally we must emphasize the importance of the interpretability of the dog's intraspecies communication system. Its vocalizations and postures could be read by the naturalist-hunter. For those who need guidance, I heartily recommend Desmond Morris' book *Dogwatching*. (If dogs could read I would recommend Morris' *Manwatching* just as highly.)

No wonder the dog was first and remains so close to us. In general, however, something else was probably important in narrowing the list. The candidates had to be camp followers or cohabitants. When humankind ceased to be continually nomadic, when we put down roots and established semipermanent habitations, hut clusters and finally villages, we created an instant, rich food supply for guilds of opportunistic feeders. Think of our ever-present messmates today, and think of the mess we produce for them to exploit.

Many birds and mammals parasitize our wastes and feed from our stores. They do so because their wild behaviors provide the mechanisms for opportunistic exploitation. A striking example occurred in Britain during the 1940s and '50s. In those days, milk was delivered to the homeowner's doorstep in glass bottles with aluminum foil caps. Rich cream topped the milk, the paradise before homogenization. A chickadee known as the blue tit learned to puncture the cap and drink the cream. The behavior spread among the tits, and soon milk bottles were being raided in the early morning throughout Britain. The birds were using a finely tailored behavior in a new context, applying the peck used to find grubs in bark to bottle caps. If the birds had been so specialized that they only fed in deep forest, it never would have happened. But these were forest-edge opportunists, pioneers rather than conservatives. It is from animals of this ilk that we find our allies and our foes.

What of the how question? My prejudices tell me that we first domesticated those individual animals that were orphaned by our hunting ancestors. In my years in the tropics, mainly in the so-called Third World, I have seen many wild animals raised by simple people in their houses. The animals were there, without thought of utility or gain, mainly because the hunter in the family had brought the orphaned baby back for his wife and children. In Panama it was often a beautiful small, spotted cat that bounced friskily out of a peasant's kitchen to play at my feet. The steps from the home-raised wolfling to the domestic dog probably took countless generations. I bet it started with affectional love and curiosity. Only later did it become useful.

When we consider that there are more than 55 million domestic cats and 50 million dogs in this country, and that they support an industry larger than the total economy of medieval Europe, we must recognize the strength of the ancient bond. Without the "aid" of goats, sheep, pigs, cattle and horses we would never have reached our present population densities. Our parasitization of some species and symbiosis with others made civilization possible. That civilization, in turn, is increasingly causing the extinction of many animals and plant species. An ironic paradox, indeed.

Michael H. Robinson
Director, National Zoological Park

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"My favorite GM car I worked on was the '54 Buick. Got one for myself and kept it all these years, even after I retired. Every time my son looks at it, he smiles. Very popular at the time, I tell him.

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MARK OF EXCELLENCE

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By William H. MacLeish

The Blue God

For centuries mariners have hitched rides on the great ocean current known as the Gulf Stream, but much about it remains a mystery

"Look for a tide rip in about 90 minutes," the captain of the chemical carrier *Exxon Wilmington* told his deck officer. "It'll be setting southeast to northwest." The captain, Larry Wonson, was looking for markers that would set him up for a free ride on the most spectacular current system in the world. The tide rip was one of them. Another lay ahead: the west wall, which is the inshore edge of the current, nearest Florida. Once he'd found that, he would set a parallel course about a dozen miles out to sea, and we would probably be close to where the current flows fastest. With summer coming on, the west wall is likely to be pretty close to shore. Maybe.

The *Wilmington* was running through the Straits of Florida, the narrow sea separating the Florida peninsula from Cuba and the broad shallows that surround the Bahama Islands. She shuttles lubricating oils and plasticizers from Exxon's refinery in Louisiana to New Jersey. When I boarded at Baton Rouge, we ran down the Mississippi to the Gulf of Mexico. I watched the river roiling its load of stolen silts and thought of the names it has carried. Indians had called it the Father of Waters, others simply Old Man River. The metaphor for me came from T. S. Eliot, who lived by the Mississippi as a boy. "I do not know much about gods," Eliot wrote in *The Dry Salvages*, "but I think that the river / Is a strong brown god—sullen, untamed and intractable."

Why are there palm trees on the Scilly Isles?

I was looking for a god of another color. A blue god. I was working on a book about the Gulf Stream, the mysterious current that has also been called a river in the ocean, about its effect on the North Atlantic and the climate and civilizations of the lands bordering it. For almost five centuries the Stream has served sailors crossing the Atlantic, determining trade routes and landfalls. Yet even as early mariners used it, they did not understand it. We do not even fully understand it today. The long held and seemingly logical notion that the warming Stream, running against the shore, helps palm trees grow in Ireland, the Scilly Isles and Brittany has proved not quite true. My reporting would mean several years of voyaging, not all of it on the Gulf Stream itself. I would also sail on, dive in and fly over sister currents that form a great swirl in the ocean, called a gyre.

The *Wilmington* was a good ship to set out in. Every two weeks she enters the Stream. Her skipper is on speaking terms with the blue god. His crew calls him the Gulf Stream guru. Wonson grew up in Rockport, Massachusetts, minored in oceanography at the Maine Maritime Academy and has been on the Exxon East-coast run for 15 years. When the company began a research program to see how its ships could best use the Stream's currents to cut fuel consumption and save time on the voyage north, Wonson worked with marine scientists assigned to his vessel.

Now to help him search for the west wall, the *Wilmington*'s captain has Coast Guard reports on current location and velocity. But he still relies more on any hunter's truest friend, instinct built from experience. Ragged lines of drifting weeds tell him something of what is going on at the surface and below. The current often runs dark blue, and so he keeps an eye out for indigo. He looks for lines of squalls that sometimes build over the west wall where different water masses meet. And he runs regular checks on the temperature of seawater in the engine intake. Especially near the surface, the Gulf Stream system railroads enormous amounts of warm water northward; if the temperature at the intake drops, you've probably missed your best connection.

Wonson started hitchhiking back when we were still in the Gulf of Mexico, taking advantage of an exten-

Winslow Homer's theatrical painting *Gulf Stream* stirred viewers' worry over fate of drifting mariner.

sion of the Gulf Stream system that scientists call the Loop Current. The Loop pokes up between Cuba and Mexico through the Yucatán Channel, shedding eddies that swirl off into the Gulf. Most skippers rounding the thumb of Florida pull out of the current at a point from which they can steam a geographically direct course. By contrast, Exxon captains follow the Loop for 10 or 15 miles beyond that point. Then they head up for the Dry Tortugas, west of the Florida Keys, to get an optimal push from this tributary of the blue god. The *Wilmington* did that and saved half an hour, maybe a little more. Then she skirted the Keys and closed on Miami, making 20.5 knots as against the 16.5 she can do in slack water. Larry Wonson grinned as he read the speed indicator and said, "I sense the presence of external assistance."

When you're an observer aboard a working ship, it's best to stay on the bridge, if the captain will allow it, out of the way in some corner where you can watch and be forgotten. Wonson let me take over a high chair and small desk way over to starboard, and there I sat, 86 feet above the sea and almost 500 aft of the bow. A perfect place for reading and jotting down notes, and sending the mind out to settle on the sea.

I was disappointed by what I saw. During a decade of work editing a magazine of oceanography, I had developed some idea of the Gulf Stream's power. By now, the *Wilmington* was well into the Florida Current, which runs from the Straits up the coast to Cape Hatteras. It is there, according to many oceanographers, that the current becomes the true Gulf Stream, flowing out eastward toward the Grand Banks of Newfoundland. The Florida Current, in fact, transports water at a rate of about 30 million cubic meters per second. (A cubic meter of seawater would fill a giant claw-foot bathtub to overflowing.) The current constantly changes speed and direction. At its fastest it does five knots or a bit more. On land, a jogger can go much faster. But try swimming against a five-knot current. Faced with less than a knot of flow, divers wearing swim fins cannot move against it for long unless there is bottom nearby to crawl along.

Such a giant of motion should show itself, I thought, muscling up as a big river does, a multiplication of Mississippis. But no. To my untutored eye at least, we could have been running through just about any part of the subtropical Atlantic. Wonson found his west wall and pointed it out to me. It turned out to be just a slick on the surface a couple of miles off, puny for the boundary of a god's domain. "If we were to cross the edge head-on," he said, "you'd see your wake in the distance moving north with the main current and your near wake moving south in the countercurrent." The edge, in fact, is often so sharp that you can cross it in a ship's length or two.

"He was not eaten by sharks," Homer asserted, "and was rescued by a passing ship not in the picture."

More flow than all the rivers in the world

Up near the Grand Banks, the Stream is somewhat cooler and runs slower, but the volume of water it transports increases to at least 150 million cubic meters per second, something like 100 times the flow of water in all the rivers in all the countries of the world. A great-grandfather of waters, indeed, yet a flow often masked by fogs created by its passage under the cold air coming off the Canadian Maritime Provinces.

Storms can make the Stream dramatically visible. A northeaster blowing down against the current combs it into nasty steep waves that make sailors miserable. The *Wilmington* ran into such a storm on a recent trip. Nothing of consequence got bent, but the crew took a beating, and the ship lost a lot of time. On this passage, though, the sea simply dozed. Swells on their way to the sands of Florida slipped across the bow in close order, following on in a rhythm slow as sleep. In

Just after Columbus, in 1497, the explorer John Cabot made it from Bristol to Newfoundland and back.

such a duck pond, it was difficult to believe that there was a giant below, carrying me along as the demon beneath the keel carried the Ancient Mariner.

It was even more difficult during the first days of European exploration. Ships then were blocky and slow. They could run before the wind or reach across it, but could beat toward it only obliquely and only with great difficulty. Against a wind *and* current, they were all but helpless. If the blue god caught them, escape could be difficult. There was little they could do but wait for a breeze from the right quarter. Christopher Columbus made the first reported crossing of the North Atlantic, running before the trade winds along the southern arc of the Gulf Stream's gyre (see map on pp. 50-51). No one knows how many more ships and men preceded him on that same southern route—Phoenicians, Celts, Jews—never to return, some to be borne away on the Gulf Stream.

Luckily, Columbus missed the Stream

By great good fortune, Columbus missed the Gulf Stream. According to Samuel Eliot Morison, the celebrated historian of Europe's American discoveries, had the Admiral of the Ocean Sea not decided to alter course as he neared the Bahamas to follow flocks of migrating birds, he and his mutinous crew might have sailed into the grip of the great current. Then, Morison speculated, "The fleet would have touched (and perhaps more than touched—gone ashore) on the coast of Florida somewhere between Jupiter Inlet and Cape Canaveral." If they did not go aground in a swell or following sea—if, in short, they survived—they might well have been "swept along the coast of Georgia and the Carolinas, returning to Spain (if they managed to return) by the westerlies north of Hatteras and Bermuda."

Going adrift on undrinkable water is a hard fate for landsmen to think about. Winslow Homer learned that when his ubiquitous painting *The Gulf Stream* went on exhibit in the early years of this century. It shows a black man lolling on the deck of a derelict sloop, the sea around him studded with sharks, and the public was quick to react. "The criticisms of The Gulf Stream by old women and others are noted," the painter wrote to a dealer who had told him about the flap. "You may inform these people that the Negro did not starve to death. He was not eaten by the sharks. The waterspout did not hit him. And he was rescued by a passing ship which is not shown in the picture."

Columbus was a notable navigator. He not only discovered the way to America, he developed a sense of the currents encountered along that way. When becalmed in open ocean, he took to lowering a sounding line to learn—from the way the line departed from the

During his 1492 voyage, here fancifully portrayed about a century later, Columbus successfully followed the northeast trade winds to the New World, turning south just before he encountered the Gulf Stream.

vertical—something of what was moving below the surface. He marked the presence of several flows associated with the Gulf Stream system. But the admiral never met the blue god and so never discovered the best way home from America.

The man who did unwillingly discover it, feeling its power just off what is now the city of St. Augustine, was Juan Ponce de León, one of the most rapacious of Spain's conquistadores. Already the subjugator of Puerto Rico, in 1513 Ponce de León sailed in toward the Florida coast to look for treasure—and a certain spring said to rejuvenate a man's amatory powers. He found neither. But in the course of closing with the land—which he named Pascua Florida, because it was Easter—he found the Florida Current, which whisked one of his vessels out of sight before it could sail free of the flow and get back to the anchorage.

It was not Ponce de León but his pilot, one Antonio de Alaminos, who first put the Stream to use for the greater glory of Spain. Alaminos was a preeminent reader of the sea, and he remembered what he read. His skill was such that in 1519, when Cortés took Mexico, he asked Alaminos to carry home news of the treasures turned up by conquest, to dazzle the Spanish court. Alaminos' instructions were to make the fastest possible crossing, and he did so, letting the Loop Current help him cross from Mexico to western Florida. When he passed the Tortugas, he took an enormous gamble. He remembered the vessel from Ponce de León's fleet being carried north by the sea that clear day at Eastertide. "He thought," wrote a historian of the time, "that those mighty currents ought to empty somewhere into an open space." He bore away downstream into the open space of the North Atlantic. As he

William MacLeish often writes for SMITHSONIAN. *This is the first of two articles from his new book,* The Gulf Stream, *issued by Houghton Mifflin.*

Columbus 1492

Cabot 1497

Ponce de León 1513

Alaminos 1519

Wilmington

CANADIAN MARITIMES

Labrador Current

Westerli

Gulf Stream

CAPE HATTERAS

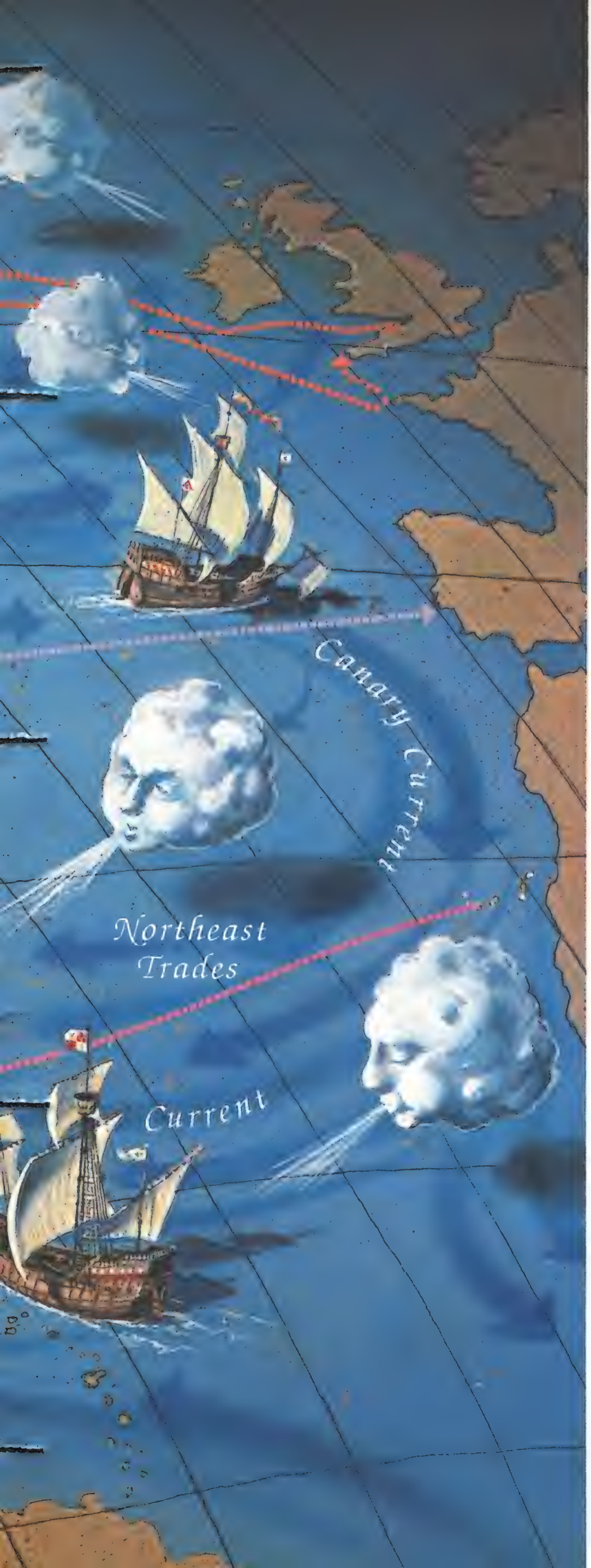
Sargasso Sea

Florida Current

North Equatorial

CUBA

Loop Current



went north, the prevailing wind pattern shifted, blowing first from the east and then from the west. When the first long breath of the westerlies hit him, Alaminos turned toward home, his sails bellying full.

That return voyage established what came to be known as the Highway of the Indies and literally changed the course of world history. Treasure galleons began to follow Alaminos' highway from the Caribbean and Gulf of Mexico, while Spanish ships outward bound to the New World generally followed the Columbian track along what came to be called the southern route.

During his nautical gamble, Alaminos probably composed a rutter—that is, a set of sailing instructions that early pilots guarded as if they were gold. In a sense they were, for if you had good rutters, chances were you could get wealth. "If from Havana thou wouldst set they course for Spaine," reads an early Spanish rutter, "thou must goe Northeast and so shall have sight of the Martyrs [the Florida Keys, so named because some of their rocks looked to the Spanish like men suffering] . . . and the coast lieth east and west. The marks be these; it sheweth like heads of trees, and in some places [there are] certaine rocks with white sandy beaches." In the shallow waters, the use of the lead was all-important for ascertaining depth, as well as the type of bottom. Black sand stuck to the tallow packed into the end of the lead meant one location, "shellie ground and periwinkles" another.

As the Spanish conquest radiated south and north from the Caribbean, the great current became part of the route used for exploration and settlement. After the Spanish came the British, French and Dutch, raiding and settling. Spanish forts went up as far north as the Chesapeake. Undaunted, the British took and held Virginia, which the Spanish considered part of their Florida.

Columbus' fellow Genoese, John Cabot, established a northern route to the New World in 1497, just five years after the admiral established the southern route. Yet more than a century separates the Spanish settlement of Santo Domingo and the first French fur-trading post at Quebec. The Northern lands were more forbidding, and the first great treasure found there was not gold but the noble cod swimming in mobs over the Grand Banks off Newfoundland.

Long before navigators understood them, linked swirls and eddies of the Gulf Stream System around the Atlantic basin, when combined with the northeast trade winds and the westerlies, determined the course followed by early mariners, and the shape of maritime progress. Watery vortex, known in oceanography as a gyre, still puzzles scientists and helps shipping.

In pioneering the northern route, Cabot and his successors sailed to the Grand Banks and followed the Labrador Current down the coast. Generally they ran north of the Gulf Stream, but on occasion they entered it. One indication that they did comes from Cabot's chroniclers, who reported that the beer in his hold suddenly turned warm.

Advances in maritime skills and ship design permitted captains to take more liberties with the winds. Vessels began voyaging almost directly across the ocean. Some bucked the Stream and its cousins a good part of the way. The Pilgrims did that, evidently. Not much is known of their passage, but it took them 66 days. They were aiming for the Virginia lands, but as they tried to cross the Stream, one theory has it, they got shunted up to Cape Cod. That sort of thing did happen. The British adventurer Bartholomew Gilbert, coming up the Stream, stayed in the current too long, overshot the Chesapeake and finally got off at New York.

In time, the British decided that using the southern route to go much farther north than Virginia didn't make sense. They divided their holdings, the southern to be serviced by the Columbus route, the northern by more direct runs across the Atlantic. The Dutch in what is now New York stuck by the southern route, so the end result was a geographic anomaly: colonies a couple of hundred miles apart depended on sea lanes that varied in length by 3,000 miles and in latitude by as much as 30 degrees.

I had planned to walk up the *Wilmington*'s long foredeck to the bow. I love standing over the water, looking down as the blade of a ship's hull slices and plows. Often dolphins surf there, planing off the bow wave, heads slightly down to catch the angle of sheared water. But something—the cargo, the miles of pipeline running fore and aft—put me off, and I stayed astern, shifting in my mind from human interactions with the Stream to the billions upon billions of plants and animals that have migrated in it.

Not that the Stream is a populous place. Waters lying over the continental shelves and slopes of North America are far richer in marine life. In fact, the near-surface layers of the Stream support not much more life than do those of the arid Sargasso Sea, which borders it offshore. Species abound in the current, but populations are apt to be small—and often a long way from home; I have seen butterfly fish swimming in a Rhode Island cove, carried thousands of miles from their native bottoms, thanks to the Stream. It is the business of currents to entrain, to catch up and carry along. The Florida Current and the Gulf Stream are champions at providing such submarine transportation, moving not only water, nutrients and pollutants, but also life forms that either are incapable of resisting the pull of the flow or, likely, ride it out of some innate preference.

I have dived with marine biologists along the eastern edge of the Florida Current, drifting in the company of beautiful transparencies—barrel-shaped salps, winged snails, Venus' girdles—all moving downstream. Eventually, most of them will die out as the water that carries them cools or as contortions in the current pull them into hostile environments. But while they live, they add

Benjamin Franklin was one of the first men to make a study of the Gulf Stream system, and to try charting it in detail. His 1769 map was lately rediscovered by Woods Hole oceanographer Philip Richardson, and has just been acquired by the Library of Congress.

a spectacular and eerie variety to the temperate ocean.

Some species do what the *Wilmington* does. The king of the hitchhikers is the giant bluefin tuna, which can grow to well over 1,000 pounds and swim in spurts of up to 50 miles per hour. These giants regularly catch rides from southern wintering grounds to their pantries up off New England and the Canadian Maritimes. Blue sharks appear to use the Stream as a highway, too, and so, to a lesser extent, do some swordfish and sailfish.

The North Atlantic is the most thoroughly studied of oceans, as the Gulf Stream is of currents. Yet mystery far outswims certainty here. We still have difficulty tracing patterns of circulation and of migrations. It is possible that some species take a round-trip ride. Students of sea turtles suggest that hardy specimens may run the Stream, pick up currents running east from the Grand Banks, shift to other flows bending down toward the Azores and Africa, and return to their natal beaches in the southwestern North Atlantic via the Canary and the North Equatorial currents. The existence of that swirl, that gyre as oceanographers call it, may partly explain why American giant bluefin, gaunt from traveling, are found swimming with their European cousins off the coast of Norway.

Nothing in the sea is more mysterious than the eel. The animal lives in fresh water and spawns in salt, yet few photographs have ever been made of adult eels deep in the North Atlantic. All of them were taken by cameras aboard the *Alvin*, a small research submersible. At this point all marine biologists can do is theorize about how the young eels, the transparent, leaf-shaped leptocephali, get back to the rivers of their home shores. The strong belief is that the leptos drift with the gyre following courses of varying length. European stocks take about three years for their journey, American stocks take only one.

The *Wilmington* neared Hatteras, the legendary cape of storms. "If the Tortugas let you pass," mariners said, "beware the shoals of Hatteras." Diamond Shoals, the graveyard of the Atlantic, lay far off the port bow. Many of the vessels buried in those sands were driven in on the shoals while on their way north, down the Stream. Many more, particularly after the development of Colonial maritime trade, met their fate while sailing the other way, coasting south along favorable countercurrents inshore of the blue god. As they closed on Hatteras, their opportunities for maneuver dwindled perilously; they ran in the narrows between the Scylla of the shoals and the Charybdis of the Stream.

All along Florida and up past the Carolinas, the current lies against the continent, running over a vast

plateau. The surface of the plateau is scoured by flows so strong that they bore along some wreckage of the space shuttle *Challenger*, making a difficult recovery operation more difficult. But at Hatteras, the current, now officially the Gulf Stream, literally falls into the North Atlantic. In ways scientists don't yet understand, it separates itself from the coast and enters the ocean interior. It spreads out, too, covering more than 50 miles of ocean surface. It slows, picks up more water and starts a kind of oceanic snake dance. It writhes into meanders that grow into what on land would be called oxbow lakes but here form rings or eddies that curl inshore or seaward of the main flow. Some rings descend right to the ocean floor, 4,000 meters down, but the current itself is apt to bottom out at around 2,000 meters. Overall, the Stream's reactions to the gravitational and rotational forces of the Earth become more complex.

Early sailors knew nothing of this and precious little about any other current moving out of sight of headlands and other terrestrial reference points. They had no adequate marine chronometers to time the sun's nooning and thus establish any reliable idea of longitude. During the initial exploration (and exploitation) of the New World, cartographers often masked oceanic ignorance behind drawings of sea monsters and mythological phenomena like the Maelstrom, the man-eating whirlpool off Norway. Well into the 18th century, when marine chronometers were available, charts paid less attention to currents than to shoals and reefs and other stationary obstacles to navigation.

Mariners learned as they sailed. No one knows how the Gulf Stream got its name. The Gulf of Mexico might have been involved, though it is equally possible that the gulf in question was the Gulf of Florida, an early name for the Florida Straits. I have come across references to the blue god as the Sailor's Current, and I'm sorry the name didn't stick. They certainly deserve the tribute.

Scientific study of the Stream suffered from the same misinformation and superstition as did maritime cartography. Oh, there were theories aplenty. One held that ocean waters poured into the Earth through holes in the North Pole and reappeared, fresh and sweet, fountaining into headwaters of the rivers. Some said that the currents followed the stars as they circled the planet, but others reckoned the sun evaporated so much water at the Equator that waters rushed into the steep valley thus created. Slowly, however, as the natural philosopher began to listen more to the mariner, oceanography stirred into life.

One stirring seems, at first glance, a particularly odd concatenation of events. Shortly before the American Revolution, complaints came to an agent in London about delays in their mail service from the mother country to the New World. The agent in turn put the matter before a visiting cousin, a Nantucket whaleman. Oh yes, said the whaleman, he and his colleagues often chased whales along the edge of the Gulf Stream. They had often seen British mail ships slogging along, plugging straight into the current. He had hailed them on occasion, he said, and told them of their plight. But they were "too wise to be councelled by simple American fishermen."

The London agent? A Mr. Franklin, of Philadelphia. He asked his cousin to outline the position of the great current and provide instructions on how best to deal with it on the mail routes to the Colonies. Timothy

Eel, photographed by submersible *Alvin*, may have used Stream system to help it return to home river.

Folger did so, and the result was the Franklin-Folger map (p. 53). There were three editions, the first printed in 1769 or 1770. It was remarkably accurate for its time, but the British evidently remained too wise to be counseled. During the American War of Independence, Franklin gave the map to the French. Possibly it helped in speeding French aid to the struggling rebels.

Benjamin Franklin was a man of catholic curiosity. The subjects of his observations ranged from electricity to smallpox, whirlwinds and waterspouts to Scottish tunes, the effect of oil on water to problems of population. He understood the influence of winds on oceanic currents. But lacking the dynamical sophistication of modern oceanography, he attributed the strength and length of the Gulf Stream to its "considerable Descent, and moving from Parts where the Water is higher, to Parts where it is lower." It was a good try. There is descent of sorts along the Florida Current—half a foot or so over the length of the Florida peninsula—but that, we would later learn, is only one of several forces shaping the Stream.

During several of his transatlantic crossings, Franklin took a sea thermometer with him, painstakingly recording water temperatures. He even devised a container that would collect water at depth, but the pressure stove in his stoppers. His faith in the thermometer was such that he overestimated its powers to track a single current. At one point he thought he had followed the Gulf Stream right across the Atlantic to the Bay of Biscay, but there are other sources of warm water in the ocean.

The Stream mingled with the blood of the family Franklin. Ben had taken his son William, and William's son, William Temple, to sea to help him with his research. Ben's grandnephew, Jonathan Williams, was so admiring of the sea thermometer that he claimed it could locate not only currents but "banks, coasts, islands of ice and rocks under water." Franklin's great-grandson, Alexander Dallas Bache, was the more reasoned scientist. Bache headed the U.S. Coast Survey in the mid-19th century, a position from which he directed some of the first intensive research on the causes and serpentine course of the Gulf Stream. It was while engaged in that work that Bache's brother George, captain of the brig *Washington*, lost his life to a hurricane off the dread shoals of Cape Hatteras.

Bache's great rival in Washington was a U.S. Navy lieutenant and gifted popularizer of things oceanic named Matthew Fontaine Maury (SMITHSONIAN, March 1984). Maury developed a valuable program for collecting and collating shipboard observations of winds and currents. He also developed a description of the blue god which to this day sticks in the public mind. "There is a river in the ocean," Maury wrote. "In the severest droughts it never fails, and in the mightiest floods it never overflows. Its banks and its bottoms are of cold water, while its current is of warm. The Gulf of Mexico is its fountain, and its mouth is in the Arctic Seas. It is the Gulf Stream."

That is a powerful metaphor. It is hard not to think of the great current in other than riverine terms. It is, after all, the Stream. Its writhings and sheddings are

Swarms of small, semitransparent salps like this one are carried north from warm climates to cold.

Bluefin tuna is one of many submarine hitchhikers, sometimes riding for miles to new feeding grounds.

In the days of sail, the sweep of the currents along the Carolinas' coast used to carry ships aground.

called meanders and eddies. Yet the Gulf Stream, of course, is not literally a river, as we shall see (next month, in the second part of this report). It is more like a ribbon flow of current that separates the warm water of the Sargasso Sea from the cooler East-coast waters of North America.

The federal government continued to push investigations of the Stream. Beginning in 1885, John Pillsbury, a naval officer serving with the descendant of Bache's outfit, then called the U.S. Coast and Geodetic Survey, actually went out and anchored in the Stream. It was a tour de force rather than a practical technique, requiring miles of special cable, special winches and a kind of shock absorber to do the job. But when he was done, Pillsbury's instruments, including an effective current meter of his own design, produced data on the Stream's ceaselessly changing velocities and flows that were used for years afterward. Pillsbury too could not resist the Maurian metaphor. "In a vessel floating on the Gulf Stream," he wrote, "one sees nothing of the current and knows nothing but what experience tells him; but to be anchored in its depths far out of the sight of land, and to see the mighty torrent rushing past at a speed of miles per hour, day after day and day after day, one begins to think that all the wonders of the earth combined can not equal this one river in the ocean."

On the last morning of my trip aboard the *Exxon Wilmington*, we sighted our first land since Florida, the highlands of New Jersey. Above them and all along the western horizon, a brown stream flowed, a Mississippi of the air, a river of smog. Larry Wonson told me we had left the Stream about eight hours before. Sometimes, if you're lucky, a meander of the current will give you a ride close inshore; in winter, that can mean not only a boost in speed but a warm, looping flow that keeps ships from icing up.

No such boost this time. Elapsed time for the trip wouldn't be even close to the 3 days 17 hours logged on a New York run the previous year. "The engines went 1,595 miles," Larry Wonson told me, and thanks to the push of the Stream "the ship went 70 miles more than that." The current had saved us only 4½ hours. Still, in fuel and related costs, a cut in 4½ hours in steaming time worked out to a savings of $5,000. That, multiplied by the run of two ships—the *Wilmington* and her sister ship, the *Exxon Charleston*—every two weeks or so, added up to real money.

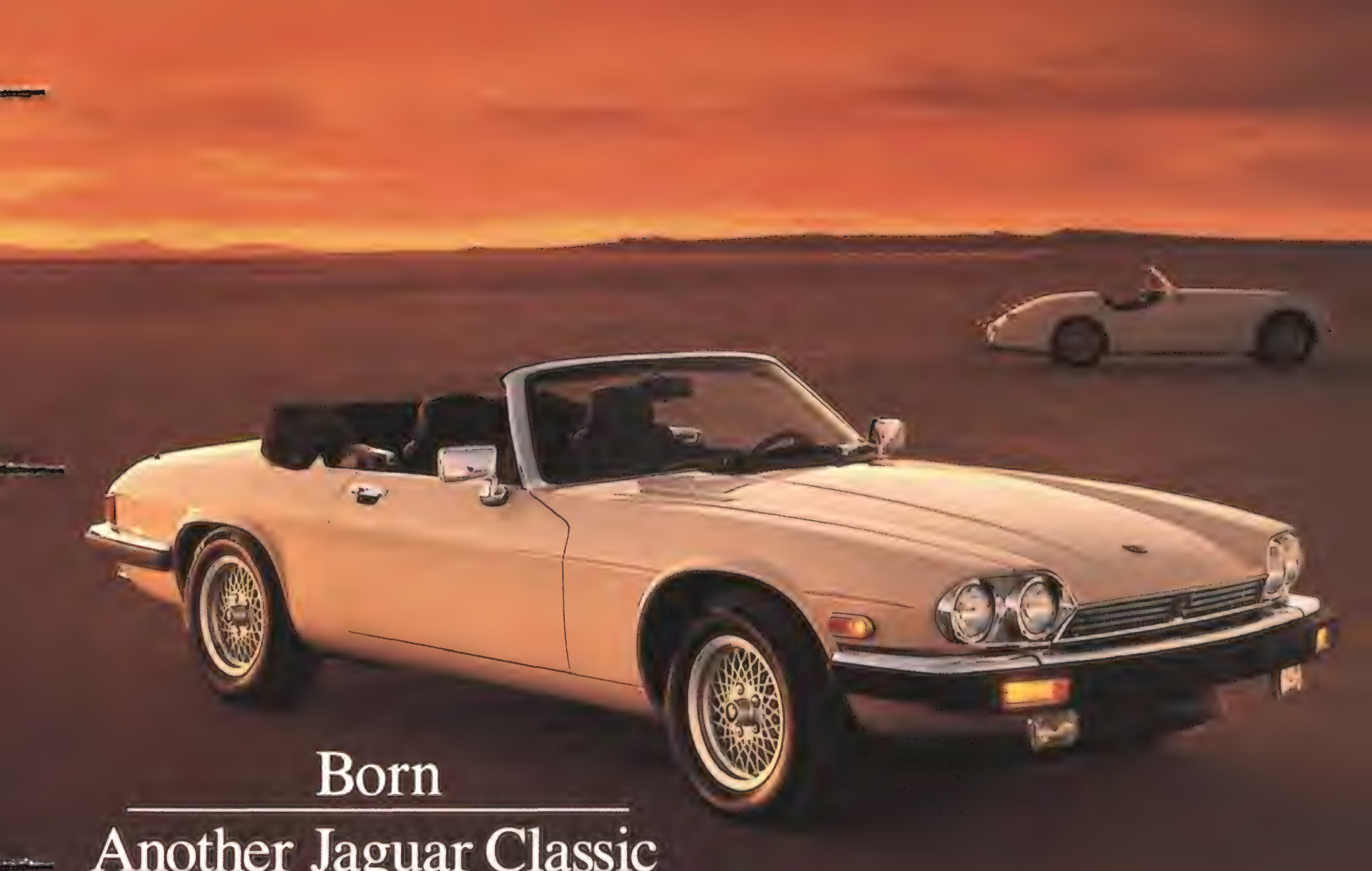
We were well within the inbound traffic pattern now, ambling in a line of wide-hipped container ships, tankers and bulk carriers. Ambrose Light showed ahead, at the foot of New York Harbor. As we prepared to take on our pilot for the run in, I thought of another harbor, far smaller, a day's steaming farther up the coast, the snug little port of Woods Hole under the shoulder of Cape Cod.

After the daring Lieutenant Pillsbury, American involvement in Gulf Stream research—indeed, in oceanography generally—sagged a bit. Or perhaps the energy building in European centers of marine science made it look that way. The Scandinavians in particular took the lead, developing theories to explain how winds affect current formation and how water moves beneath the surface. Yet early in the 20th century, concerned U.S. officials found oceanographers to be as rare as hen's teeth. There was one center on the West Coast, the Scripps Institution of Oceanography in Southern California, and not much to speak of on the coast abutting the Gulf Stream. To rectify the situation, in 1930 the Rockefeller Foundation and other agencies underwrote the formation of the Woods Hole Oceanographic Institution in Massachusetts.

Wonderful days for oceanography

The "Oceanographic" started out with one building and one ship. She was the largest steel-hulled ketch of her day, and for the first 15 years of her long life, she was the only craft in the United States built exclusively for blue-water research. Her name was the *Atlantis*, but people who knew her called her the "A-boat." Her skipper, a young man with the appropriate name of Columbus Iselin, spent a good deal of time on the currents and eddies of the Gulf Stream system.

Iselin, who refined the concept of that system—Florida Current here, Gulf Stream there—showed a seaman's humility in addressing his subject. "The



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JAGUAR XJ-S

Larry Wonson, captain of the *Exxon Wilmington*, has helped oceanographers study the Stream up close.

problem of oceanic circulation," he wrote, "is such that we cannot hope for a satisfactory solution for a long time to come." But his eye and his hunches produced conclusions that have survived revision by successive investigations to which all science is heir. Iselin began to refine and qualify, for instance, the popular concept of the Stream as simply a hot current in a chilly sea. The warm part of the current stays mainly on the surface, to a depth of only a couple of hundred meters. "The fact is," Iselin reported, "even the south-east side of the current (except at the surface) is not quite as warm as the water at corresponding depths in the Sargasso."

Those were wonderful days for oceanography. The science was too young to insist on advanced degrees for her practitioners. Painters and college stop-outs, would-be ministers and yachtsmen with a taste for research went to work on the A-boat. They got seasick, played pranks (one radio transmission back to Woods Hole reported "Sea state: 6. Sobriety: 0") and came home with a sustained record of Gulf Stream behavior. That data helped nourish an expansion—a revolution, even—in the study of the dynamical processes that govern ocean currents.

The *Wilmington* lazed into an anchorage near Brooklyn and dropped her hook. She rode too low in the water to negotiate the channels leading to her delivery point back of Staten Island. A barge would take on some of her cargo. While we waited, Wonson talked about the return trip. He wouldn't mind accepting the knot-and-a-half assistance provided by the countercurrents near Hatteras, he said. But Diamond Shoals retains its reputation, and Exxon won't allow its skippers within miles of the place. So, to avoid the Atlantic's graveyard, the *Wilmington* would cut eastward across the Stream and run down outside it.

Once on the side of the Stream farthest from land, she might be able to catch a ride on one of what are known as cold-core rings, those curious eddies of the Stream that catch up cool coastal water. Cold-core rings rotate counterclockwise, and usually move west or southwest. (Warm-core rings, patches of Sargasso Sea captured by meanders, wander coastal waters in generally the same directions, but rotating clockwise.) The trouble is, you may run into the wrong part of the ring and get a brake rather than a boost. The *Wilmington* had that bad luck once when she was dodging around a hurricane. "The ship was clicking along at 16.5," Wonson said, "then, bingo! She's making 13."

As I rode to shore in a water taxi, I took one last look at the ship. The skipper stood out on the bridge wing, talking with one of the mates. Far up the harbor, the stelae of lower Manhattan rose in clear light, and I thought of the *Wilmington*, outbound, hunting flows that would take her back, skirting the domain of the blue god, to the home of the brown.

I, too, would soon be outward bound, asking questions. Where, really, does the Gulf Stream go? What makes it so powerful? Will it continue to affect our lives? The responses would provide a portrait of modern oceanography, now a full-grown science employing a full range of intriguing, space-age instruments. They would create a deeper respect for the ways in which the blue god still guards its mysteries and its marvels.

Kicking up a froth in the dark-blue Stream, Wonson's tanker rides the famous current toward Hatteras.

Next month: Science and the Stream

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By Julia Markus

Two years after his death, the curtain rises on Andy Warhol

A sweeping show brings together the images that changed the way we see things—from Campbell's soup to Marilyn Monroe

Kunsthaus Zurich

Admirers applauded, decriers derided Soup Can series; Warhol said they reminded him of his childhood.

It's August 6, 2028, and it's not science fiction. It's *The Andy Warhol Story*—the major motion picture, released to commemorate the hundredth anniversary of the 20th-century artist's birth. I see this future event as clearly as I used to see Andy in the 1980s, at the Rock Hotel, in front of Lincoln Center; once he even took a snapshot of a friend of mine. One way of knowing you've been anywhere in New York in the latter part of the 20th century is having seen Andy Warhol there too: his thin frame, his pale, pockmarked face, those noncommittal eyes looking straight at what he wanted to see, the weird white hair (you could count the thick strands of it on his outlandish wig), the ubiquitous jeans. *The Andy Warhol Story* will be the *Lust for Life* of the 21st century, for by then all the gossip, intrigue and jealousy surrounding the artist will have settled like diamond dust on one of his canvases, and the obvious will be in focus. Andy Warhol was a pivotal artist of his time and place, a driven, prolific, inventive, ambitious, canny American force who, since the 1960s, at once represented and created many of the artistic values of the latter part of this century.

Andy was the antithesis of the bohemian 19th-century artist who was at odds with his society and his psyche. Andy Warhol was psyched by his century. He had a lifelong infatuation with the America of his childhood: the America of comic books and pictures of the stars you could send for, the America of instant celebrity and banner headlines, of Hershey's chocolate bars—that down-home America of advertisements and window displays. Andy saw us as the Woolworth's of the Western world, and rather than dress us up as Europeans, he took us as we are, and did what all good artists do, changed the way we see most everything—from a Campbell's soup can to the electric chair.

His similarity with the 19th-century ideal of the artist is that, ironically, the importance of his art could not begin to be evaluated until after his death. This is not because he was obscure, but because he was so successful in capturing media attention that he would gain not only fame, but notoriety. As an artistic self-promoter, not unlike Salvador Dali and Norman Mailer, he was so clever that the distinction between his art and his image blurred in the public mind, and to many his art is just another media event, hype, a scam. The artist himself is stuck with his image of the '60s, a bizarre character who lived a bizarre life. Warhol, the more recent helper of the homeless at the Church of the Heavenly Rest, the daily churchgoer, even the man who went shopping every day, was never advertised.

Late *Camouflage Self-Portrait* was done while Warhol was intrigued with hide-and-seek aspects of vision.

Private collection

The jolting images of Andy Warhol

Though he had the attention of the world, our eyes are only now clearing from the glitter and tinsel of the celebrity that upstaged his art. On February 6 a show opens at New York's Museum of Modern Art, a sweeping retrospective that was designed to set things straight. Andy foresaw it. His friend Henry Geldzahler, the noted expert on contemporary art, recalls Andy saying, "It will take my death for the Museum of Modern Art to recognize my work." Andy died alone on February 22, 1987, at the age of 58 following gallbladder surgery at New York Hospital. Geldzahler told me that very soon afterward he got a call from the Museum of Modern Art about a retrospective of Andy's work. Now, a little less than two years after his death, the MOMA show he predicted is here. We can begin to discover Andy Warhol, not the media event, but the artist pure and not so simple.

The show, which runs through May 2, contains some 200 paintings, 75 works on paper, including many of the early commercial designs, and installations of sculpture—the largest gathering to date of his work in one place. Included are works from the early series based on advertisements and comic strips; portraits from the early '60s (Marilyn Monroe, Elvis Presley, Jackie Kennedy), which have become landmarks of a sort of the age; disaster images (car crashes, electric chairs); flowers; and the commanding series of Chairman Mao of 1972-74. There are examples of more recent series, including Reversals, Last Supper and Camouflage (1985-87); and there are a number of self-portraits. The exhibition will be at the Art Institute of Chicago from June 3 until August 13 and then go abroad to London's Hayward Gallery; Museum Ludwig, Cologne; Palazzo Reale, Milan; and the Pompidou Center in Paris. Seldom has the work of a contemporary American artist been given such a whirlwind European tour.

A part of the Warhol mystique not to be seen in the MOMA show is his famous Factory, site of the avant-garde films that made a splash among cineasts for some years and scene of a series of notorious goings-on. Warhol's studio became known as the Factory in 1963 when he moved to 231 East 47th Street, a place that began by being covered entirely in aluminum foil and silver paint, the work of a roommate, poet Billy Linich, aka Billy Name. In 1968 the scene shifted to 33 Union Square West and in 1974 to 860 Broadway. In the early '80s, it would make one final move, to 22 East 33d Street. But wherever it was, the Factory was a core and a fulcrum, a magnet for poets, critics, artists, would-be artists, and filmmakers with attendant actors and actresses, some of whom became widely known personalities of the press. There was Viva, for example, and there was Ultra Violet. There was the tragic figure Edie Sedgwick, the young actress who died of an overdose of drugs two years shy of her 30th birthday. There was always an entourage and there were always hangers-on. Andy carried the scene with him wherever he was and wherever he went. In later years the temperature dropped to normal and the Factory, which exists to this day at the East 33d Street address, became the

Julia Markus, head of the creative writing program at Hofstra University, is working on her fourth novel, A Change of Luck, *to be published by Viking.*

Estate of Andy Warhol

A religious man, Warhol added, perhaps as a moral reflection, his logo-touch to Leonardo's *Last Supper.*

The juxtaposition of contemporary commercialism and the great devotional painting makes a quiet point.

business and creative headquarters of the vastly successful Andy Warhol Enterprises Inc.

Where did this master of the media come from? He was born of Czech immigrants in Pittsburgh. His father was a construction worker in the maintenance department of J&L Steel. His mother, Julia, who spoke broken English and read Dick Tracy comic strips to Andy, did housework after her husband died. She was a devout Catholic and had great influence on her three sons. Andy was the youngest. She would live with him in New York from 1950 to 1970, where, wearing her babushka and speaking her own version of English, she'd cook for Andy and charm the artists and the jet set. He had two older brothers, Paul and John. The family name is Warhola.

John, the middle brother, was the closer to Andy. In the multimillion-dollar Foundation for the Visual Arts set up by Andy's will, John was named a director and vice president. For the 38 years Andy was in New York, John called him every Sunday.

I call John Warhola, a retired Sears appliance parts clerk. My name opens a line of communication. "Ah, Julia," he says, "that was my mother's name." His voice is reverent. "My mother drew self-taught and had a great voice for singing. You have to have it in you. We all drew when we were young. There was free school on Saturday at the Carnegie Library. I went for a while.

John Richardson

Julia Warhola here holds two of her three sons, John, at left, and Andy, right, at age 2. It is circa 1930.

Estate of Andy Warhol

Warhol made this posthumous portrait of his mother, who lived with him in New York for 20 years, in 1974.

David Whitney

Portrait of architect and patron of the arts Philip Johnson, complex and penetrating work of 1972, was accomplished in nine panels, each 32 inches square. Variations in the repeated image of Johnson are created by Warhol's painting of the canvas before application of silk-screened portrait.

But at 13 you'd rather play ball. Andy stuck it out."

What was Andy like as a child? "He was very religious. He didn't want anyone to know his private life. I thought he'd be a priest. Nothing upset him. I always tried to protect him. You know, blond, blue eyes, he was quite a target for bullies."

Andy was religious throughout his whole life. There will be late religious paintings fashioned after the Italian masters, and studies of skulls in the MOMA show. "It's the way Mother brought us up," John says. "Religion and love for each other." Andy Warhola.

"You know," John tells me, "right before Dad passed away, he predicted it. Predicted Andy would be famous." The father died three months before Andy was 14. "Five days before he died he told me to take care of Andy; he'd go to college. There was enough money for two years of college and two on scholarship. Andy worked. I was paying for the bills at home. He worked at the dairy store at 35 cents an hour. He did art work [window display] at Joseph Horne's department store." John tells me that since Andy "was a kid his primary interest was in art." There were early watercolor drawings, a lot of them from when Andy was 15 and 16. "I just threw them out. I thought he'd just make a living at art, not become famous all through the world." Not only did he throw out Andy's work, but—pure Warholia—he also once gave away a baseball autographed by Babe Ruth.

I ask John what he disliked most about his brother; he answers, "Nothing." Then I ask what he liked the most and I get a moving answer that stays with me. "Money didn't change him. Material things didn't affect him. He could purchase anything, but he was always the same. When I'd meet him in New York 30 years ago and now, he had the same ways. He was always modest, and I'll always remember and respect him for it."

I leave a message for Paul Warhola explaining who I am and asking him to call back. He does: "You know why I called you back? Because you have my favorite name. Julia was my mother's name. She was beautiful. We all loved her. Andy did. She showed a lot of talent, loved to sing." During the years she lived with Andy, he bought her tape recorders. "She'd have two or three tape recorders back in those days, reel tape, and she'd

Estate of Andy Warhol

The Statue of Liberty's 200th anniversary was commemorated with this six-foot-square work in 1986, not long before Andy's death. It employed the camouflage technique he was involved with at the time. Things shown and others hidden were meant, maybe, to reveal more than the obvious.

sing over the tape. She liked Peter, Paul and Mary."

Retired, Paul lives on a farm. "I was in the junk business. Andy'd say, 'Bring up what you can.' I had cleanup jobs. I brought up truckloads of antiques—I like anything old. During the '50s I had a lot of clean-outs. I'm fascinated by bronze things and old things. Andy said, 'You should get stuff and bring it up and open an antique shop.' " I mention Paul's love of antiques is similar to that of his famous brother, who was a world-class collector of everything, from the cookie jars that went for a small fortune at the Sotheby's auction of his estate last spring, to the furniture that went for a fortune at Sotheby's.

Paul, the oldest brother, remembers Andy's early school days. "He went when he was 4. Some little girl smacked him and he came back and didn't want to go again." At 8 he got Saint Vitus' dance, a recurring childhood illness that Paul connects to that incident. Then he could stay home in bed, tracing and drawing. To entertain the ailing Andy, "I'd put wax over the whole surface of a comic strip, then turn it over on white paper, take a spoon and rub it and trace it right on." Andy colored and drew and was fond of photographs of the stars. Paul sent for the one of Shirley Temple for his young brother. She autographed it, "To Andy Warhola from Shirley Temple." He kept it.

I ask Paul about 1968, when Valerie Solanis, founder and sole member of SCUM (Society for Cutting Up Men) shot and almost killed Andy at the Factory. How did the brothers first find out about the shooting, through the news? "Mother called us and we rushed up. The doctor said, 'Andy's fifty-fifty.' Mother took it bad. But mother was always a believer. 'Paul, don't worry. Andy'll be OK.' "

The next days were touch and go. Andy would spend nearly two months in the hospital. Paul remembers Andy in intensive care, his face all swollen. What did he talk to Paul about, when he could talk? "He was always concerned about us."

On happier occasions, the family would visit Andy and Julia Warhola in their New York town house. The nieces and nephews would play with Andy's exotic toys and arcade equipment. "They'd bother him. Couldn't get nothing done with them around." The kids would

Topicality and decorative impact of Warhol's work are evident in *Diamond Dust Shoes,* 1980. Diamond dust and inked silk-screen images were superimposed on hand-painted canvas to create this glittering work.

grab his Dick Tracy comic books and try to take them home, but Andy wouldn't let them. They used to sleep in bedrooms upstairs, loaded with sculptures of Campbell's soup cartons and Brillo boxes. They'd kick them around. "It looked like a grocery store." One daughter took a Campbell's carton. "You did?" Andy queried. Paul's voice registers the joke: "Just for that you're not getting a wedding gift."

My general impression after speaking to the brothers is one of a deep-rooted decency. The lively, artistic, religious mother seems to have had a big influence on all three. I ask both whose idea it was for Julia Warhola to live with Andy. Both agree it was hers. And I try to picture the scene in which this immigrant woman calls her youngest son, then a struggling artist living in a basement apartment, and tells him that she wants to leave Pittsburgh to live with him in New York City. The Big Apple. The fast lane. The place talented young people come to from all over the country, partly in an attempt to get away from their roots. And I think of Andy Warhola, the devoted son, happy to say, "Yes, come." A penetrating and loving portrait of his mother (p. 65), done in 1974, two years after her death, will be in the MOMA show.

There's a common impression, far from the truth, that Andy sort of stumbled into art. It is true that in his early years in New York he supported himself and Julia Warhola as a commercial artist, a brilliant and award-winning one. Jesse Kornbluth's new book, *Pre-Pop Warhol,* should cast fresh light on this area of his early career. His commercial work is delightful.

He drew from the start. His brother John told me that he would do portraits of the youngsters in the neighborhood, and through him and the Pittsburgh Children's Museum, I located Nick Kish, a boyhood friend of Andy's with whom he used to draw. They were

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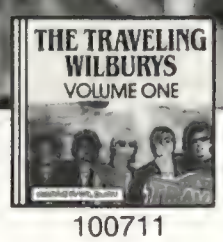

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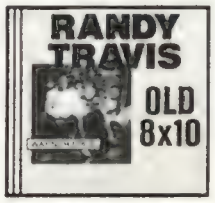

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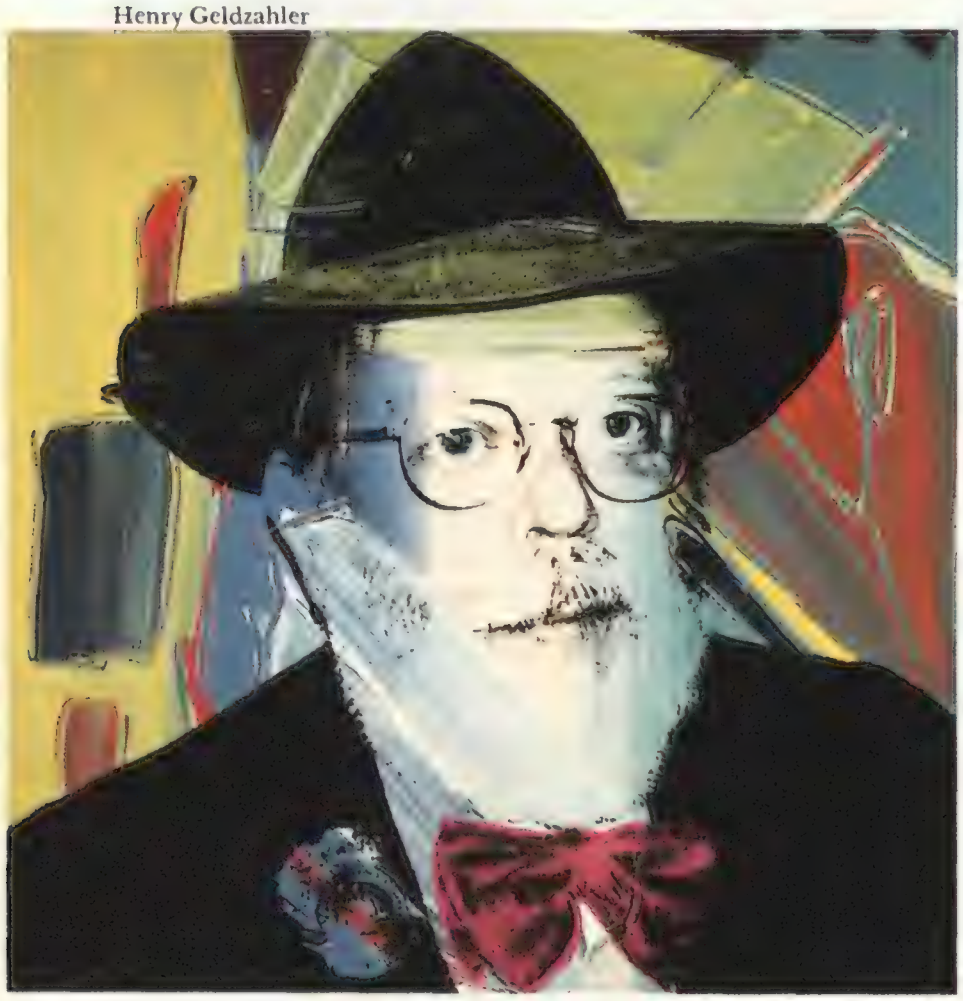
Comic-strip images of first Pop works, 1960-61, were projected on canvas, then traced in pencil, then painted.

Henry Geldzahler



Warhol used unusually heavy brushstrokes for portrait of Henry Geldzahler to emphasize the "art" in it.

friends through grade school and on into college. "We were three doors away," Kish, a semiretired mechanical engineer, tells me over the telephone. "Andy was shy, quiet. He had art in him." As early as grade school the two boys would go out sketching together. Nick was always interested in the straightedge mechanical aspects of drawing. Andy was "a stylist who saw things and people in a different way." Sometimes they'd experiment with each other's method. Still, when they drew a huge milk can that they'd hit with a hammer, it was Nick who'd be interested in why the can distorted structurally, while Andy would be interested in the unique shape.

"I painted Andy, he painted me"

"We weren't 24-hour bosom buddies, but on Saturday mornings we'd go to the park and sketch. Andy'd say, 'Hold your hand out.' Why? 'I want to draw it.' 'Here it is on my nose,' [Kish would answer] 'draw it.' " And Andy did. In this way, "I painted his hand, he painted mine. I painted Andy, he painted me."

About three years ago, Kish's daughter, going through the attic, found perhaps the earliest known portrait by Warhol: a portrait of Nick Kish, done when Andy was about 13. Kish dates it around 1941. It is a competent portrait in oil on cardboard, and the rendering of Kish's tie has a certain Pop quality to it. The teenage Andy signed his name in red. While looking at a snapshot of it, one that Nick Kish kindly sent me, I suddenly notice it was already signed Warhol. It is as if Andy Warhola had a very early idea of who he was going to become.

The young boy who loved to paint and draw from his earliest days, the Depression child from a poor home, will leave Pittsburgh in 1949 to seek fame and fortune in New York City. He understands his country very well, and he knows that to be successful in the visual arts in the latter part of the 20th century, he has to be seen. I think it is important to realize that Andy Warhol didn't have a radio in his house until he was 11. And he was born before tape recorders and TV. All new forms of communication would fascinate him throughout his lifetime. In many ways, the media was the message for him.

His friend Henry Geldzahler tells me Andy was a very funny man, but "not a social climber. He was Mount Everest, people climbed him. He was ferociously intelligent and well-informed. He knew a hell of a lot." The antics of the '60s—appearing on programs in which he wouldn't talk and Henry would have to answer for him, sending an impersonator on a college lecture tour because Andy himself had trouble talking—these things changed after 1968. "He was different after he was shot," Geldzahler emphasizes. "He retreat-

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Private collection, Berlin

Do It Yourself (Sailboats), 1962, uses hand-painted image to create mechanical, mass-produced effect by choosing subject derived from painting-by-number hobby kits. Numbers were mechanically produced and transferred to the canvas by the application of heat.

ed for a few years." *Interview*, the magazine Warhol published, "got him out again." After the shooting he always had people with him: "He was never quite so secure." Andy was a man who "never stopped working." Whatever the media hype, the brash image that, ironically, he could hide under, his art "came from somewhere else." For Henry Geldzahler, Warhol was, beyond camp, an extremely serious artist.

The art historian and critic Robert Rosenblum, of New York University's Institute of Fine Arts, has contributed an essay to the MOMA catalog, and remembers running into him. "He was mute and passively aggressive. He was an absolute mask. It was his professional stance," he recalls. I decided to veer around personalities and ask the big question first: How did Andy Warhol rate, as an artist? A highly respected authority on the great 19th- and 20th-century artists, Rosenblum is as familiar with Ingres as he is with Cubism, with the 19th-century Romantic tradition as he is with Warhol.

"I have a strong opinion," Rosenblum says, and pauses. "I think Andy Warhol was one of the handful of great artists in the last quarter of the century. I'd put my hand in the fire for that. I think he's supreme and my conviction has grown as I've seen later work and seen his importance to subsequent art. The thing about him—epic scope. He tells everything about the American way of life—the world in general, communication, celebrity, death as a commonplace in this world. He was like a prophet and fulfillment of our times."

Rosenblum goes on to say that Andy's been "a totally unknown artist in the last 20 years. No one had an inkling of what he was doing." Looking at the catalog mock-up was an "archaeological experience," he says. "It's like a King Tut experience." Rosenblum compares it to Picasso's story, the surfacing of art after his death. Why had many of these works not been seen? "I don't know. No New York museum has had a significant show of Andy's work since the portraits of the '70s," and by themselves these portraits offer a partial view, a "warped idea," of the artist's work. Most of the works of the '70s and '80s were commissioned by Europeans and haven't been seen here.

"Talk about anything new in modern art in the last 30 years and he's there. I've become an evangelist, thrilled through the works of the last years," Rosenblum says. Not every expert will agree.

Robert Hughes, the critic for *Time*, for example, an admirer of Warhol's early work who wrote, "Warhol's fixation on repetition and glut emerged as the most powerful statement ever made by an American artist on the subject of a consumer economy," thought that the "intensity began to leak out of his work after the shooting, and by the end of the '70s it was gone."

After Warhol's death *New York Times* critic John Russell wrote that "his portraits began by looking flashy and opportunistic, but the best of them now seem to be freighted with truth about his sitters. And if, sometimes, he produced some terrible stuff, we never lost the feeling that he would come back again on top form. Posterity may well decide that his times deserved him, and were lucky to have got him."

Janet Maslin, a film critic for the *New York Times*,

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Warhol wig, watch, glasses, money are set against Egyptian Revival busts that were part of his collection.

writing in 1987 of a documentary on Warhol in which he appeared along with a number of writers, museum people and critics, noted a variety of attitudes ranging from "the flippant to the unexpectedly astute." She concluded, "When Mr. Warhol remarks that 'Culture is slowly disappearing'—a process to which he undoubtedly contributed—it is both."

Of course it's quite difficult to look objectively at the work of an artist whose media image was almost blinding during his lifetime. It will be interesting to see if our perception of the artist is changed when we see some of his images in their original context. For example, most of us have seen at least one or two of the Mao portraits. These works, as most of Warhol's oeuvre, were inspired by the news, this time President Nixon's trip to China. MOMA plans to set them up as they were in the 1974 show at the Musée Galliera in Paris.

And, as an emblem of Warhol's enigmatic art, how will we feel about the Soup Cans? How seriously can we take painted and silk-screened Campbell's cans? Was the artist laughing up his sleeve? Was he being engagingly playful? Nothing wrong with making people stop to look at everyday objects. But is that all there is to it?

Before I saw the photographs of the works included in the show, I was foolish enough to think I knew the Campbell's soup can. But there's only a straight-edged soup can in my head. I hadn't seen any of the ones with the torn labels. Nor had I seen the early wooden box with soup cans stenciled on it in such a way that the cans looked stacked as they are in the supermarket. Perhaps only the Warhola nieces and nephews will have previously seen so many different versions of the 1962-64 Soup Cans in one place—those they saw on visits to New York in one of Andy's crowded upstairs bedrooms.

The high art of Soup Cans

Artistically, Warhol is making us look at everyday objects. The average viewer might say the same thing of his work as he might of the abstract art of the '50s: "It's not art. I can do that. What does it mean?" Here Robert Rosenblum's catalog essay, "Warhol as Art History," is quite helpful, for it establishes the intellectual parameters of the debate. Rosenblum connects the Soup Cans not only with Pop Art, but also with the "more elite world of high art." And he connects Warhol's own love of repetition and monotony with that of the abstract artist.

From a historical perspective, we begin to see that Andy Warhol bridges the high art, low art schism. His Pop images can be looked at as variations of the ordinary or can be seen as conscious abstractions. As an artist he can be viewed, Rosenblum points out, "within the more cerebral company" of many abstract artists. If the viewer rebels against the banality of Warhol's subject matter, he might be rebelling against the tenets of Modernism as well as against certain hallmarks of our particular commercialized culture. It is his right. For others, to view the Soup Cans is to acknowledge the world we live in and to recognize once more that what the true artist does—in any age—is teach us to see. These viewers find in the varieties of Soup Cans of the '60s, and in the updated ones of the '80s, important and exciting examples of 20th-century art. And the element of put-on in them is an element universal to contemporary art.

Rosenblum's essay, by establishing the criteria by which Warhol's art must be assessed, has also placed the artist firmly within the framework of the Western tradition. As the experts ponder, we museumgoers will have the chance to see and interpret much of that art for ourselves.

Warhol left two legacies: his art and his Foundation. To the outsider, the Andy Warhol Foundation for the

Visual Arts seems consistent with his life. The Sotheby's auction of his estate, the proceeds to go to the Foundation, netted more than $25 million. The Foundation he's set up should insure that Andy Warhol will be one of the first artists to become a major-league patron of the arts in his own century and beyond.

Then there's the legacy of his art. There are those of us who think he was a master craftsman and an extremely important artist whose reputation will grow into the next century. Will the MOMA show cause controversy? Will his art be recognized in his own country, not for the hype surrounding it, but for its own sake? We are just at the beginning of *The Andy Warhol Story*. For years Andy maintained his 15 minutes of fame. His art will make its own claim for something more substantial.

Surreal image of *Moonwalk* (History of TV series), the most recent work in the show, seems to catch the moment better than actual photographs in sense of drama and isolation. Warhol died soon after making it.

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By Richard Wolkomir

Mounties forever, but these days rarely on horseback

The Royal Canadian Mounted Police, now coed and up to date with copters and snowmobiles, are still bringing peace and order to the North

In ceremonial red tunic uniforms, Mounties perform famous Musical Ride, all that's left of the horses.

Mustached Mounties were captured by the camera at Queen Victoria's Diamond Jubilee in London, 1897.

Considering the Royal Canadian Mounted Police's record of derring-do, the Case of the Suspect on the Tin Roof ranks somewhere between a speeding ticket and a loitering bust. Still, as Sherlock Holmes used to tell Doctor Watson, it has a few peculiarities that might interest you.

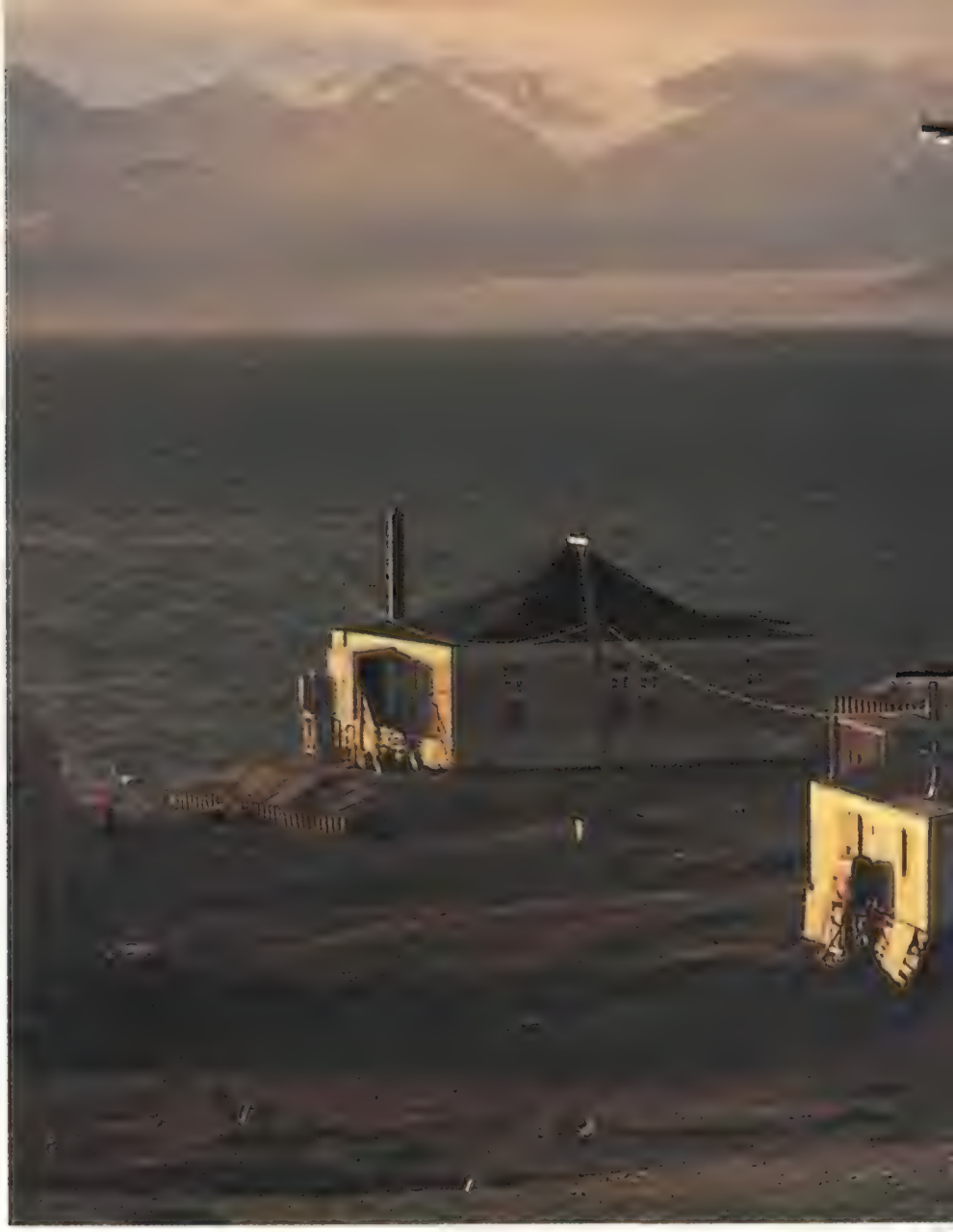
For one thing, the scene was Pond Inlet, far north on Baffin Island, high up in dogsled country. The district's two resident Mounties, Corporal Marcel Deveau and Special Constable Keesak Nowdlak, patrol a beat that is almost as big as all outdoors: 45,000 square miles of tundra, glaciers, gloomy mountains and floes studded with icebergs that look like fairy-tale castles. The district's 950 Inuit, mostly hunters, together with a smattering of kabloonas (whites) from "outside," live in Pond Inlet's hodgepodge of prefab houses, huddled beside frozen Eclipse Sound. The streets, with snow slicked down to make easier passage for Ski-Doos, end at the settlement's edge. Beyond live caribou, seals, walrus, narwhals and polar bears.

At 7 one morning, a resident telephoned Corporal Deveau to report a drunk neighbor raising a rumpus. The suspect, a beefy Inuit hunter, already faced trial for assault. But Deveau, a good-natured French Canadian from Nova Scotia, with the 240-pound, six-foot-four frame of an Oakland Raider, dwarfs everyone else in town. He does not speak Inuit, however. And so he asked Constable Nowdlak to come along, too.

The two Mounties inevitably evoke Mutt and Jeff. In his heavy-duty parka, Deveau looks like Mont Blanc; Nowdlak is compact. But the Inuit constable not only speaks Inuit, he also understands Inuit customs. And, when they go "out on the land," it is Nowdlak who has the Arctic skills to keep the two Mounties alive. He embodies the rapid passing of the Arctic frontier. Just 35 years ago he was born in a sealskin hut, and lived in huts and igloos until he was 8, when his family gave up

The Mounties still get their man

In workaday blue, Constable Keesak Nowdlak, an Inuit, inspects polar bear skin that's being cured for a rug.



The center of Nowdlak and Deveau's 45,000-square-mile beat on Eclipse Sound is tiny Pond Inlet, pop. 999.

nomadic hunting and settled in a town. In the Arctic, modernity is a newcomer. It was only 20 years ago, in 1969, that the Mounties on Arctic patrol completed the switch from dogs to snowmobiles.

The suspect's house, typical of Pond Inlet, had a packed-snow yard littered with sleds, caribou antlers, and the skins of polar bears and Arctic foxes nailed up to dry. Constable Nowdlak knocked and went in. Corporal Deveau waited outside, arms crossed implacably, dark mustache frosting up, eyeing the windows. Sure enough, in a moment the suspect, wearing only his pajama bottoms, crawled slyly out an upstairs window onto the porch's tin roof.

From the yard, Corporal Deveau read him his rights. The man hunkered on the roof, staring down gloomily. Corporal Deveau waited affably until the suspect began to shiver. "I want to call my lawyer," the man announced through chattering teeth. He crawled back through the window into his bedroom, where Constable Nowdlak applied handcuffs. "He didn't really want to talk to an attorney—he just was frozen solid," says Corporal Deveau. A few weeks later, Deveau encountered the man in town. He smiled sheepishly at the Mountie and said, "Hi, Marcel."

Only 1,200 miles from the North Pole, this Northwest Territories channel is frozen ten months a year.

Out of town, French-Canadian Mountie Marcel Deveau carries a rifle—mainly as defense against polar bears.

So ended the Case of the Suspect on the Tin Roof, not with a bang but a greeting. A trivial episode, it nevertheless catches nuances of Mountie history.

There was, for instance, the semifrontier setting. Canada created the Mounties in 1873 to police its frontier, which is now gone. Today the RCMP is Canada's federal police force—it's as if the U.S. Government were to amalgamate the FBI, the Drug Enforcement Administration, the Border Patrol and other law-enforcement branches. Except in Quebec and Ontario, the force's 16,560 men and women (who were first recruited in 1974) also function as provincial police, and often as municipal police, too, handling everything from cocaine busts to highway patrol. Though tiny and extremely remote, even Pond Inlet now has telephones, microwave ovens, TV, an airport, an elementary school and a junior high school, the Sauniq Hotel, a Hudson's Bay Company store and a government building where Inuit whose parents built igloos run computers.

The author, a frequent contributor, found this assignment in the Arctic a bit more arduous than his last, on butler training (March 1988).

Still, you would never mistake it for Toronto. Supplies come in on bush airliners that buzz down four times a week onto the tiny airport's packed-snow runways. Bulky goods, like oil and building materials, have to make it in by ship during the few ice-free weeks of Arctic summer. Pond Inlet is 1,700 miles north of Montreal, 1,200 miles south of the North Pole. To get there, you fly north from Montreal to Iqaluit, on Frobisher Bay, three hours by jet. Switching to a prop plane, you fly four and a half hours up Baffin Island, over rock and ice. The nearest doctor, dentist, restaurant and barber are in Iqaluit, 700 miles away. If Corporal Deveau and Constable Nowdlak need help, the larger RCMP station at Iqaluit can send a police plane—if the plane is free and the weather permits. Otherwise, Pond Inlet's Mounties are on their own.

The RCMP's role has deep, national roots going back to the age of Queen Victoria. While U.S. Founding Fathers referred to "Life, Liberty and the pursuit of Happiness," Canada's spoke of "Peace, Order and good Government." When America rebelled, Canada stayed royal. Later, watching settlers stream into the American West to a percussive accompaniment by Winchester and Colt, the Canadians played their own western card differently.

The Case of the Suspect on the Tin Roof was thus quintessentially Mountie also because of the arrest's civility. From the start, the Mountie has been less a pistol-wielding nabber of bad guys than a precluder of disorder.

"In the 1870s, we decided to organize a semimilitary police force to establish authority and make accommodations with the natives *before* settlement began in the west," RCMP historian Stan Horrall explains. "We didn't want to repeat the U.S. experience—

Prestige of Mounties prompted others, like 1920s bootlegger patrol of Alberta Provincial Police (above), to copy RCMP uniforms. James Macleod (left), Mountie Commissioner from 1876-80, promoted a policy of fair dealings with Indians.

it wasn't so much because we're nicer people as because it was too expensive."

Keeping the peace, the North-West Mounted Police, as they were known until 1904, tended to combine grit with fair play. In 1877, for instance, five scarlet-coated Mounties and two scouts boldly rode to Pinto Horse Buttes, on the Canadian prairie, where thousands of Sioux were camped shortly after annihilating Lt. Col. George Armstrong Custer's troops over the border at Little Bighorn (SMITHSONIAN, June 1976). The government in Ottawa had charged Mounties in the area—all five of them—with the task of convincing the bellicose Sioux that north of the border the Great White Mother would tolerate no such misbehavior.

Leading this paltry party was Supt. James Morrow Walsh, a flamboyant man with piercing dark eyes and a black shrub of mustache. He dismounted at Chief Sitting Bull's tepee. If the Sioux wished to remain in Canada, Walsh told Sitting Bull, they must obey the law. They must not harass other tribes, even traditional enemies like the Cree and the Blackfoot. And they must not use Canada as a base for across-the-border raids into the United States.

While Sitting Bull contemplated all these musts and must nots, his scouts told Walsh that one Indian, White Dog, was sitting on a stolen horse. Instantly, Walsh arrested White Dog, while the warriors murmured in astonishment. He confiscated the stolen bronco. Then the Mounties rode imperiously out of the camp, the stunned White Dog in tow.

To the Sioux, it seemed that Walsh must be backed by a mighty army. But the new Mounted Police actually numbered fewer than 300.

As the current RCMP riding master, Staff Sgt. Jerry Ogilvie, who is in charge of much of what's left of equestrian operations, puts it: "We have a romantic background." Horseback treks in prairie blizzards, arrests in the gold-rush Yukon, 1,000-mile Arctic dog-sled patrols, frontier rebellions—no other police force has become such an esteemed national symbol of tenacity and endurance. Probably none has been so misrepresented, to its own disgruntlement.

Nelson Eddy in a scarlet tunic crooning to Jeanette MacDonald in *Rose Marie* was not the reality. Neither was *Sergeant Preston of the Yukon*, the 1950s radio and TV drama in which a daring policeman shot it out with Klondike nogoodniks to the accompaniment of howling wolves. Mounties have rarely shot at anyone. Rather than warring with Canada's Cree and Assiniboine, they assisted Indian tribes. Ottawa eventually moved Superintendent Walsh to another post, convinced his concern for the Sioux encouraged them to stay in Canada.

The Mounties' epic struggles have mostly been with a rugged, frozen land. The "mounted" era was brief—its last hurrah coming in 1918, when a squadron of Mounties was sent to support White Russian troops looking for Bolshevik saboteurs on the Trans-Siberian Railway. The RCMP's last three working horses were retired in the Yukon in 1938. Today, all that remains is

the Musical Ride, a team of black horses and red-coated constables who perform in shows worldwide.

Corporal Deveau and Constable Nowdlak, however, zip across the tundra on snowmobiles and all-terrain vehicles at speeds that would have astonished Sergeant Preston. They even have a truck for banging around Pond Inlet's few miles of streets and the four-mile dirt road out to the pond where trucks take on water to pump into the hamlet's tank. The Mounties allot little time for highway patrol: Pond Inlet has only 36 wheeled vehicles, and some residents still travel by dogsled. But there are traffic accidents. Not long ago, Corporal Deveau was called away from a family picnic to a collision between two all-terrain vehicles. Holding his 3-year-old son, Justin, in his arms, he read the liquor-impaired perpetrator of the collision his rights, stuck him in jail and then returned to his picnic.

Crimes can be more serious, of course. Someone recently cracked the safe at the Community Center for $3,000. Through informants, Constable Nowdlak arrested one of the two culprits.

"Just the other day a boy called at 2 A.M. to confess breaking into the school, looking for glue to sniff," Corporal Deveau told me as I sat in Pond Inlet's snug brown-and-tan RCMP station. "It's a dark-season problem," added Constable Nowdlak, referring to the long Arctic winter when the sun disappears. In the dark winter, Corporal Deveau admits, he keeps his children indoors: "It's easy to get lost and freeze, and polar bears may come into town."

In summer's perpetual daylight, residents are up all night, kids bicycling on the tundra, adults socializing, roaring off on hunting trips or doing chores. "Seven A.M. is the best time for arrests—everyone's groggy," says Corporal Deveau. During the long, subzero winter, when the Mounties patrol the streets with flashlights, even in early afternoon, "substance abuse" soars. "It's the new generation, caught between two cultures," Deveau says.

Last winter, a Pond Inlet schoolteacher was found dead in a snowbank, her body gnawed by huskies. "March 25—I'll never forget that date," says Constable Nowdlak. By questioning her friends and checking footprints, the Mounties pieced together a sad story: after drinking too much at a party, she wandered outside into the Arctic night, 40 below, collapsed and froze to death in minutes.

Once, the Mounties in Igloolik, 250 miles to the south, called in Constable Nowdlak as a translator. Two youths, fired up on home-brewed liquor, fought over a girl. "One fellow used a broom handle to poke the other guy, and it went through his eye into his brain," says Constable Nowdlak. "The accused and the witnesses didn't speak English too well." In an Iqaluit case on which he worked, a 25-year-old man, addled by drugs and liquor, stabbed another man and the man's mother with a long butcher knife.

Compared with cities, however, Arctic crime is mostly minor. "In September, when the ice is forming and they can't go out in either boats or snowmobiles, people get bored, and in the dark season people get depressed—they start sniffing glue and solvents," says Corporal Deveau. "We had one guy who was sniffing and smoking at the same time, and the stuff blew up—he lost all his hair."

In the Arctic, people are so close to the bare edge of survival that a glitch can swiftly become a catastrophe. Last year the hamlet's co-op received a shipment of

Mounties wince at fantasies like 1936 musical *Rose Marie* (left), its 1954 remake (right) and '50s TV series *Sergeant Preston.* Still, Hollywood was only half wrong; while Mounties rarely shoot they do sometimes sing.

A training academy drill sergeant barks commands at Mountie recruits, a quarter of whom are women.

bad gasoline. Hunters found themselves stranded far out on the ice, with conked-out snowmobiles. "Up here," says Corporal Deveau, "bad gas can be a killer."

Liquor is an older problem than drugs or bad gasoline. The first job of the early Mounties was clearing the Canadian prairies of American "whiskey forts," which traded "firewater" for furs. In his *Pictorial History of the Royal Canadian Mounted Police*, historian Stan Horrall cites one recipe: a quart of whiskey, a pound of chewing tobacco, a handful of red pepper, a bottle of Jamaica ginger, a quart of molasses and a dash of red ink. The most infamous dispenser of this concoction was "Fort Whoop-Up" near what is today Lethbridge, Alberta. Its "Whoop-Up bug juice" often led to drunken rows, devastated families and murder in hot blood.

Some of the original Mounties, recruited in 1873, were American Civil War veterans with a taste for military life. Others came from England, Scotland and Ireland. A few were upper-class black sheep, Oxford-educated "remittance men" who had gotten the maid pregnant or gambled or drank. Their aristocratic parents packed them off to the empire's outposts and paid them an annuity to keep away. One of the first Mounties, Sub-Insp. F. J. Dickens, was the ne'er-do-well third son of novelist Charles Dickens.

Most early Mounties, however, were Canadian farm boys. Instead of actual police work, many tended horses, hayed, blacksmithed, built forts. Sub-Constables' pay was only 75 cents per day, but after three years they were promised 160 acres of Northwest Territories land.

"Bad men and whiskey were killing us"

Because Indians tended to respect the "red coats" worn by British soldiers, Mounties acquired the scarlet tunics that are still their symbol, though today the tunics are largely ceremonial. The very first Mounties also wore jaunty yellow-and-blue pillbox hats, strapped under the chin. But after the new force's "Great March West" to drive whiskey traders from the unsettled prairies, their fancy new uniforms were shredded to rags. When the expedition set out from Dufferin, Manitoba, on July 8, 1874, it stretched for five miles across the prairie: 275 officers and men, 142 oxen, 93 cattle, 310 horses, 114 carts, 73 wagons, 2 cannon, 2 mortars, field kitchens, and mowing machines to harvest hay for the horses en route. But there wasn't much hay, it turned out, or water, either.

A thousand miles and 12 weeks later the Mounties limped into Fort Whoop-Up on St. Mary's River, having left 83 horses dead on the prairie behind them. The whiskey traders had fled, so the Mounties built forts and carried blankets and food to destitute Blackfoot, Blood and Peigan Indians. "Bad men and whiskey were killing us," the Blackfoot chief Crowfoot said as he signed a reservation treaty. "If the police had not come to this country . . . very few of us would have been alive today."

Even that early, Canada's frontier was tame, as the 1883 statistics for the Territories show: 1 murder, 13 cattle killings, 18 thefts, 29 gambling offenses, 29 horse thefts, 97 nonpayments of wages and 101 liquor infractions. Whiskey sneaked in on the railroad, hidden in sardine tins and oil cans. One smuggler brought in liquor in a coffin. Dressed in black, he rode dolorously away with it in a wagon while the police watched, "heads lowered."

Frontier Mounties were magistrates and Indian agents as well as policemen. They carried the mail. They ran jails, kept weather records, escorted lunatics to asylums, collected census data and administered laws dealing with such things as epidemics, prairie fires and "stallions-at-large." Mounties were agricultural consultants, welfare officials and immigration officers.

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They issued seed and even helped settlers pick likely farmstead sites.

It wasn't entirely peaceful, of course. In 1885, French-Indian Métis led by Louis Riel rebelled against the Canadian government over disputed land claims in what is now central Saskatchewan. Seizing the trading post at Duck Lake, they told Supt. L.N.F. Crozier to surrender nearby Fort Carlton.

Crozier, braver than he was smart, led 56 policemen and 43 volunteers into an ambush. Outnumbered, 12 Mounties and deputies died, and another 11 were wounded before Crozier retreated. Canada was traumatized. But a new railroad now linked the prairies with the east. Militia units rushed out, backing the outgunned Mounties and crushing the rebels. Louis Riel was hanged. One rebel military leader, Gabriel Dumont, escaped to Montana where he joined Buffalo Bill Cody's Wild West Show and toured the United States and Europe.

In 1896, when armies of Yankee prospectors began hiking over the passes from Alaska, headed for the Yukon gold rush, they found Mounties at the summits, politely enforcing order. "The whole demeanor of the people changed the moment they crossed the summit," says Mountie Supt. Samuel Benfield Steele. "The pistol was packed in the valise and not used."

There were bad apples, of course. In 1899, and again in 1902, Mounties promptly nabbed, tried and hanged thugs who robbed and murdered travelers.

Academy instructors try to instill pride, discipline, ramrod-straight posture befitting Mountie tradition.

And one constable had to be summarily fired—for giving three prostitutes tickets to Dawson's welcoming ceremonies for the governor general.

When the gold rush subsided, the Mounties moved on to Canada's last frontier, the frozen land north of the 60th parallel and the home of the Inuit seal hunters. It was not until 1921 that the RCMP came to Pond Inlet—and even then it was only because of a murder. The settlement consisted merely of a Hudson's Bay Company post, a handful of priests and scattered Inuit living nearby.

The story of that murder really goes back to 1916, when Newfoundlander Robert Janes set up a trading post near Pond Inlet. But supply ships never brought him goods to trade for furs and, in 1920, he set out by dogsled for civilization. He had not gone far when he argued with some hunters, unwisely vowing to shoot their dogs and them, too. The Inuit, believing he was dangerous, decided to execute him. One hunter, Oorooreungnak, entered Janes' tent. He said someone had furs to sell. When Janes went out, another man, Nokudlo, shot him.

A lonely grave on the tundra

When rumors of the killing reached Ottawa, the RCMP dispatched Staff Sgt. A. H. Joy on a Hudson's Bay Company ship. The hunters, unaware they had done wrong, happily showed Joy the grave, proud of properly burying Janes, kabloona-style. Sergeant Joy, also serving as coroner, dug up the body and sledded it back to Pond Inlet for an autopsy. Having determined that Janes had indeed been murdered, he reburied the body. The grave is still on the tundra (p. 90), a mile down the shore from today's RCMP station. Joy, acting as magistrate, issued arrest warrants. He spent several months rounding up not only the accused but witnesses, who were scattered over 60,000 square miles.

In 1923, a ship finally brought a full court, complete with robes, wigs, attorneys and Mounties in ceremonial scarlet tunics. Nokudlo, convicted of manslaughter, was sentenced to ten years in a penitentiary. Oorooreungnak received two years at hard labor in Pond Inlet, which in practice meant helping to build a police station. After the trial, according to RCMP annals, the Inuit, who had no notion of what was going on, "joined in three generous cheers for the judge."

Having established a Mountie base, Sergeant Joy made epic dogsled patrols. In 1927, with a constable and three Inuit, he traveled 54 days, covering 1,320 miles. Two years later, he patrolled for 81 days with a constable and one Inuit, covering 1,700 miles. A polar bear attacked their igloo one night but failed to get in.

According to Corporal Deveau, the real heroes of such patrols were the special constables, Inuit like

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Performing one of many duties, Constable Nowdlak inoculates a husky against rabies and distemper.

Keesak Nowdlak. "In those days," he says, "they hired specials to keep the white guys alive." One afternoon Deveau showed me Pond Inlet's tiny cemetery, on a tundra hill overlooking the frozen sound. He pointed to the graves of two early special constables, Joe Panipokochoo and Lazarus Kyak, proud exemplars of their profession.

Kyak, for instance, joined the RCMP in the late 1930s as a dog handler and interpreter. On a month-long, 600-mile patrol, Kyak heard rumors that a hunter had murdered his wife. He reported to Sgt. H. A. MacBeth, and they set out for Baffin Island's interior to investigate. Their provisions gave out, and while Kyak was hunting caribou he found an abandoned tent. Inside was a young Inuit woman's body. Later, they tracked down and arrested her husband.

In 1943, at MacBeth's request, the RCMP made Kyak a special constable. Once, far north at Grise Fiord, Kyak jumped into the icy ocean and hauled himself 15 feet down a police boat's anchor chain to free it. He could not swim, but his only comment was that he had soaked his cigarettes.

Places like Pond Inlet only became communities in the 1960s when Canada's education laws forced hunting families to settle near schools. Nowdlak's own father became a maintenance worker—and part-time Anglican priest—in Iqaluit. As a tot, Keesak had seen Mountie patrols visit his parents' igloos. In Iqaluit, he met RCMP members through a youth baseball team. While at the Sir Martin Frobisher School there, he worked summers for the Mounties, guarding prisoners. Finally, he became a member, training at the RCMP Academy in Regina, Saskatchewan.

As with Marine Basic Training in the United States, the six months the Mounties spend at Regina make them unique. Divided into troops of 32 recruits each, prospective Mounties learn how to seize and secure evidence, take fingerprints and draw plans of crime scenes, as well as self-defense, weaponry, swimming, police driving. "We train in things like night shooting," says Cpl. Pierre Bélanger, a public information officer, "with lights flashing, noise and confusion; if you weren't trained you might accidentally shoot a child or get shot yourself." Courses cover public speaking, interviewing, computers and handling family fights, always dangerous for police officers.

Special Constables like Keesak Nowdlak take similar training, but only for 18 weeks. With more courses, Nowdlak could become a regular constable, but then he would be subject to transfer anywhere in Canada, and he prefers the eastern Arctic. He has the Inuit's attachment to the land. He rarely goes on patrol, however, except to check hunting licenses or to help travelers in trouble—and Baffin Islanders rarely need help.

Last spring, for instance, two hunters with snowmobiles set out after caribou, although the sound's ice was breaking up. They became trapped on a floe and radioed to let townspeople know their situation. Corporal Deveau, new to the Arctic then, was worried about the hunters as well as the expense of calling in a rescue plane. Villagers laughed, saying the men would "call for help when they ran out of cigarettes." Days later, the men pleaded for the plane by radio, adding: "Bring cigarettes!" Deveau demurred.

On ice patrol to Bylot Island

Once, Deveau and Nowdlak agreed to let me go with them on a patrol to Bylot Island, 20 miles across the ice. Nowdlak took charge. "Out in this wilderness I'm helpless," Deveau explained as we watched Nowdlak expertly load the komatik (a long wooden sled) that would be towed behind his own snowmobile.

"We wanted to bring our kids up to know the old ways, but the times changed so fast—we do the best we can," Nowdlak said, as he packed tents, sleeping bags, food, extra fuel, rifles and other gear onto the komatik, helped by his wife, Leevee, and their three children, Bernard, 14, Moses, 10, and Kelly, 6. Like all Pond Inlet youngsters, the three Nowdlaks wear stone-washed jeans and high-top sneakers. Said Deveau, "None of these kids would be caught dead wearing Inuit caribou clothing."

It was a balmy spring morning, around 10 below, with the sun sparkling on the frozen sea. As they fueled the snowmobiles, Corporal Deveau recited with relief the kind of routine problems that the one-day patrol would allow them to escape: stolen gasoline, break-ins at every nonresidential building except the

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The murder of Robert Janes, whose grave is marked by slab of flotsam, first brought Mounties to Pond Inlet.

RCMP post, "borrowed" vehicles and 200 summonses to deliver for an upcoming circuit court. In one week the school principal's all-terrain vehicle was stolen three times—"Teenage boys, taking girls for rides," Deveau noted. "At times," he confided, "we have kept the Catholic church's sacramental wine locked up at the post for its own protection."

With a wave to the Nowdlaks, and to Nicole Deveau and the two Deveau children, Louise, 4, and Justin, 3, we bumped our snowmobiles along a rough path to the shore, then roared out onto the frozen sound. Even though only a one-day patrol had been planned, Constable Nowdlak had packed supplies in case a blizzard forced us to camp on the ice.

A half-hour and six miles out, Nowdlak pointed to a dot off in the distance. "Seal," he said. Directing his companions to park upwind, and positioned to avoid sun reflections, he unpacked his rifle and scurried across the ice with an Inuit hunter's short, quick steps. When the seal looked up, Nowdlak dropped to the ice. Finally, he dispatched the animal with one shot.

"It's an old male—we call them 'stinkers' because the meat smells," he said. "I'll divide it up for the old people in town."

We planned to lunch on caribou sausage at an iceberg—frozen into the sound—that looked like a six-story peak of solid jade. But first Constable Nowdlak snowmobiled around the berg. "We always check for polar bears on the other side," he said, with a cheerful grin. But there were none.

The three-man patrol returned safely after a ten-hour trip with a whale spine in the komatik for the village's carvers. We had covered 60 miles. Sergeant Joy, patrolling the same circuit by dogsled in the 1920s, would have been out four days.

Recently, Constable Nowdlak visited Pond Inlet's government building on a mission that would have astonished Sergeant Joy. He had to fax a list of jurors to officials in Yellowknife. But even today everything in the Arctic is harder to do: the fax machine processed the paper exceedingly slowly.

"It's the satellite—low baud rate," said the man born in a sealskin hut. He frowned, as a policeman anywhere might in the same situation, and said, "I'm going to have to do lots of paperwork to explain so much long-distance telephone time."

On another day, 28 second- and third-graders visited the Pond Inlet Mountie Station, including one girl in a Davy Crockett coonskin cap. Sitting on the floor, they looked up shyly at the enormous policemen and started to whisper their own names—Mona, Abraham, Ismael. . . . It reminded Corporal Deveau that he joined the RCMP because of his childhood admiration for the Mounties he saw in Nova Scotia.

"Do you ever hear of people sniffing glue?" Corporal Deveau asked the kids. "That's bad stuff!"

They all nodded yes. They also agreed that breaking school windows is unwise. But then came the meat of the visit—being locked in the cells, and reading scratched messages from previous incarcerees, like "Timmy A.'87—Going To Iqaluit." After a while Corporal Deveau let the girls out, and they rushed over to view the boys in their cage.

Deveau showed them his tear-gas mask ("We don't even have tear gas up here," he said), a 50-pound bulletproof vest ("Heavy, eh? Watch your toes!"), the RCMP arsenal of rifles and pistols ("Never play with guns!") and handcuffs. By fingerprinting time, law and order was breaking down. Deveau handed out RCMP coloring books.

He told them how the police find fingerprints. Boot tracks, too. "We can even trace snowmobiles, because there are over 700 different types of tracks," he said. "When people do something bad, most of the time they get caught.

"Who wants to be a policeman?" he asked.

Hands shot up. "You can all be policemen if you work hard at your reading and writing," Corporal Deveau explained, handing out "Safety Bear" badges.

As the children filed out, their badges pinned to their parkas, the last boy in line turned and gave Deveau a big, bright-eyed grin and a snappy salute. It looked like, once again, the Mounties had got their man.

With briefcase strapped to all-terrain vehicle, Corporal Deveau makes rounds, joshes with a fellow citizen.

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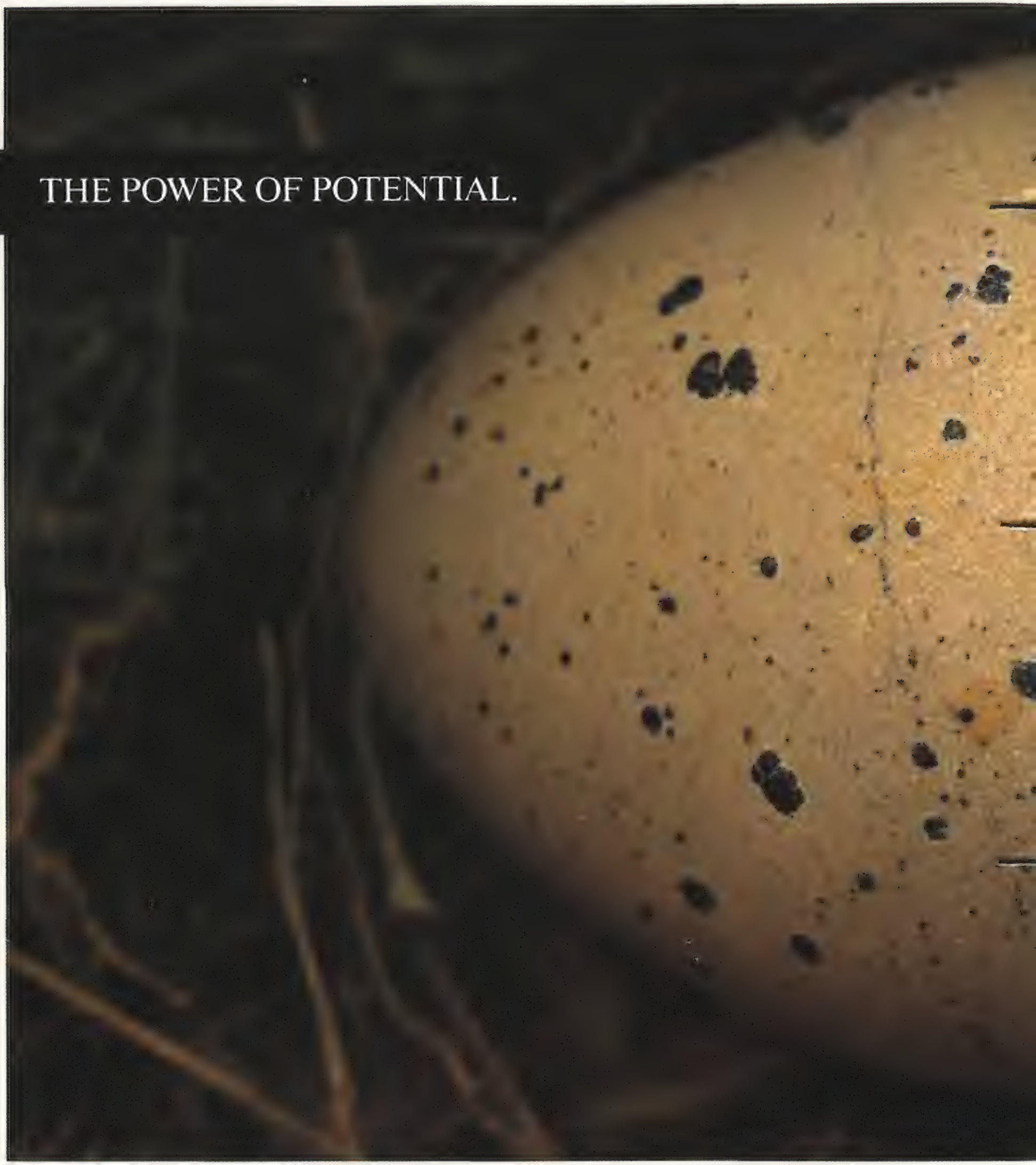

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Opposite: *Aristolochia*, a climbing vine, is brewed by forest dwellers in a tea to relieve stomachaches.

In Suriname, Mark Plotkin (above) learns the name and uses of a local plant from Koita, a Tirió Indian.

By Donald Dale Jackson

Searching for medicinal wealth in Amazonia

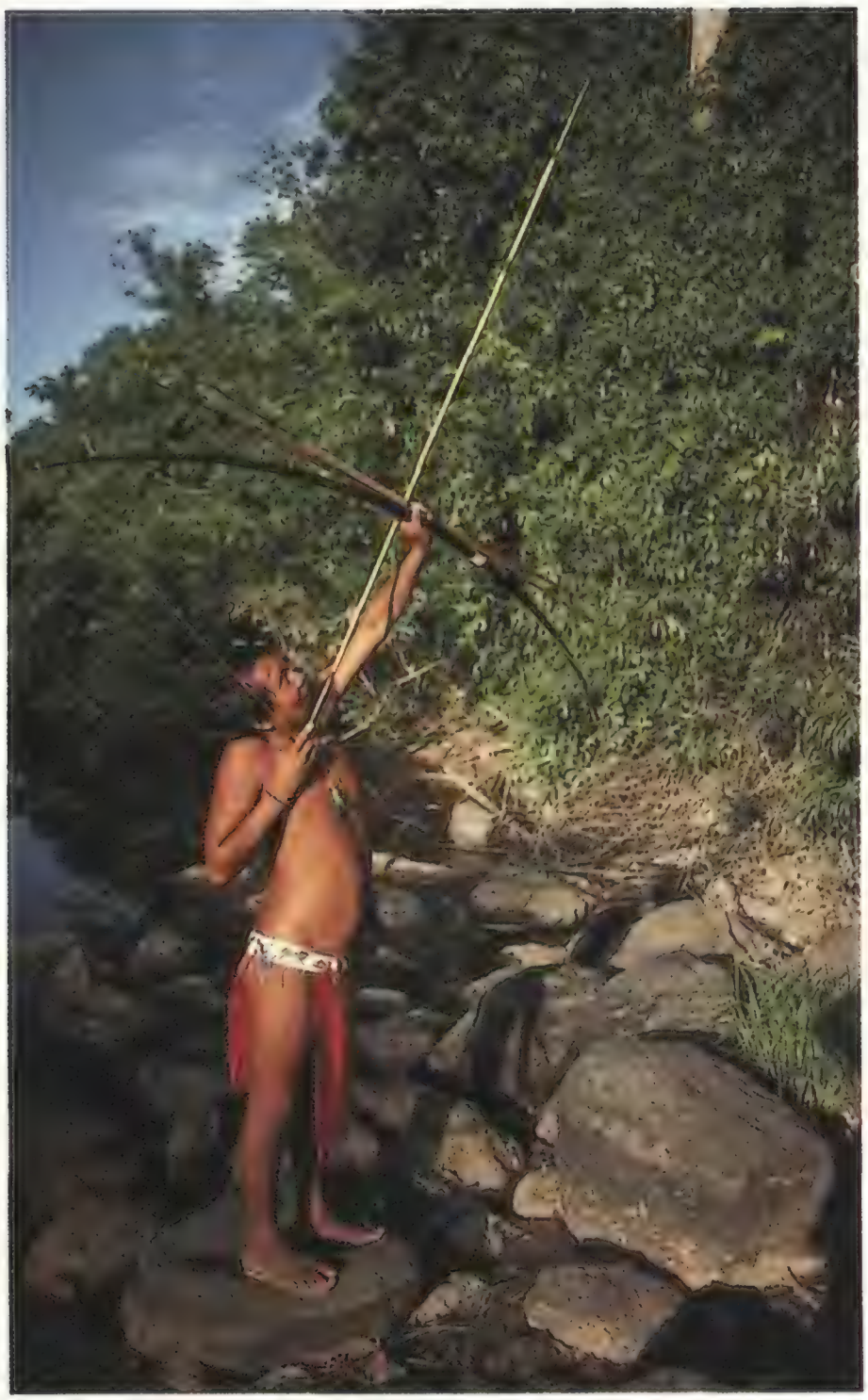
Guided by local shamans, ethnobotanist Mark Plotkin is documenting how the plants of the tropical rain forest are used for healing

An hour and a half had passed since we had seen any human scratches on the great green kingdom below us, the rain forest of southern Suriname at the northern fringes of Amazonia. Since then our Cessna six-seater had droned over an unforgiving landscape of jungle dotted with cloud-shadow puddles and tree-choked arroyos streaked by brown rivers. Even at 4,000 feet I could feel the oppressive heat, and we were beginning to descend. The lumpy carpet of rain forest gradually metamorphosed into a canopy of high trees that hid the ground.

Mark Plotkin leaned forward and squinted. Three plumes of smoke stained the horizon ahead. A few seconds later a clearing suddenly materialized, dun-colored and impossibly puny amid the green sea. Now I saw a village of about 80 thatched huts clustered beside a chocolate river. The plane aligned itself with a brush-cluttered airstrip that sloped down and then up. About a hundred copper-skinned Tirió Indians waited near a wind sock at the end of the strip. They rushed toward us as the plane bumped and sputtered to a stop. Plotkin grinned. "Welcome to Kwamalasamutu," he said. "The first time I came here I thought I'd found paradise. I still think it's as close as we're apt to get."

Plotkin—New Orleans born, Harvard trained and Washington based—was coming home, in a sense, to

Photographs by Mark J. Plotkin



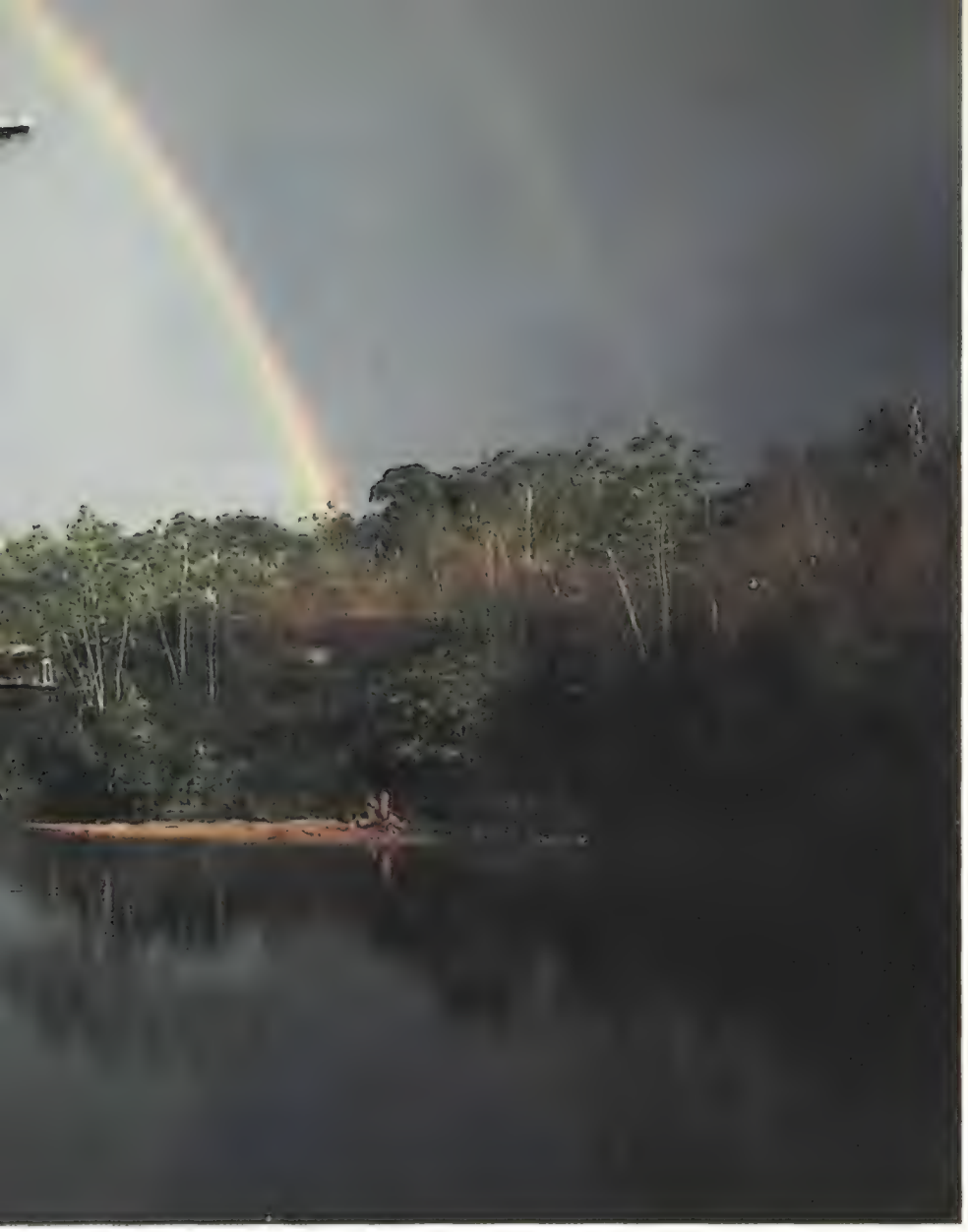
Koita shoots prey; his arrow is tipped with poison containing juice from plant Plotkin holds on page 95.

Under a double rainbow, Tirió Indian boys play along the Sipaliwini River in northern Amazonia.

this tiny settlement in Amazonia. An ethnobotanist—a scientist who studies the ways tribal peoples use the plants in their rain forest home, particularly as medicine—he has worked here since 1982. As director of plant conservation for the World Wildlife Fund, the 33-year-old, dark-bearded Plotkin has assigned himself the task of collecting and documenting the plants the Tiriós use before the mixed blessings of creeping civilization supplant the tribal medicine men and their wisdom.

The Indians mobbed him as he climbed out of the plane. Boys tugged at his arms and grabbed his luggage. Speaking Sranan tongo, the trading language of Suriname, Plotkin had a smile or a joke for each of them. "We thought you forgot us," one boy said—he hadn't been there for two years. "We were crying." Here in this exotic outpost light-years removed from his own culture, in a remote corner of a country that few Americans can identify or pronounce, the kid from New Orleans was among friends. "It feels terrific," he said.

He led a Pied Piper parade across a rickety bridge, past palm-thatched houses where women baked cassava bread over open fires and old men lolled in hammocks. Roosters bustled about and scrawny dogs who



Scientists know the chemical composition of less than 5 percent of the flora in this rain forest.

seemed to stem from a common ancestor moved sullenly out of his path. Dirt-floored, one-room huts were built 20 to 50 feet apart in no apparent pattern. The gardens where Tirió farmers raised cassavas, bananas and other crops were carved out of the forest around the village. Vivid bougainvillea bushes and heavy-branched lemon trees, both introduced by American missionaries who lived with the Tiriós until a few years ago, hugged a rise above the river, near the former missionary house assigned to us for our four-day visit.

The missionaries launched the acculturation process that now threatens to overwhelm the Tiriós. Most of the men now wear jeans or shorts and T-shirts; the women wear threadbare dresses. Outboard motors and wristwatches have appeared, along with Walkmans and tape recorders. At the moment there are no telephones, no roads and hence no cars, no resident doctor, no billboards, one meagerly stocked store and no ammunition for the few guns. "When I first came here it was wall-to-wall breechcloths," Plotkin said. "They're a manifestation of their culture. Now they wear shirts that say Puma or Cincinnati Reds. It breaks your heart."

The author, a frequent contributor to these pages, sampled tapir while reporting this story; he says it isn't one of his favorite foods.

As a field ethnobotanist who doubles as a conservation stump speaker, Plotkin is the most visible exponent of a discipline that has only recently come into its own. Where ethnobotany was once mainly concerned with plant identification, it is viewed today as a potential lifesaver. The chemical components of plants that medicine men use in healing rites could conceivably be building blocks for new drugs or even cures for such scourges as cancer and AIDS. It is this flickering hope that gives ethnobotanical work its urgency.

If the jungle is a drugstore, closing time is near

Ultimately, Plotkin and his cohorts are hunting for pharmaceutical needles in a haystack that is shrinking steadily with the destruction of the rain forests and the erosion of tribal cultures. "This is the last generation of scientists who have the opportunity to study indigenous groups and their interactions with the rain forest," says Michael Balick of the New York Botanical Garden. "Logic says that among the tens of thousands of plants that haven't been studied there must be something of value." If the jungle is a drugstore—as it is for forest Indians—the store's closing time is drawing dangerously near.

Ethnobotanists cite the tropical origins of such drugs as quinine, which is administered to malaria patients, and curare, an anesthetic and muscle relaxant used in surgery. The rosy periwinkle of Madagascar was found to contain alkaloids that have proved effective in treating Hodgkin's disease and leukemia. The National Cancer Institute commissioned a five-year investigation of plants with potential antitumor properties in 1986. In addition, research among various tropical peoples has uncovered as-yet-untested remedies that promise everything from relief of arthritis and hepatitis to a contraceptive effective for two years after a single dose. But scientists warn against expecting miracles overnight. "Even if they prove useful, the plants we collect today won't be on our shelves for at least five years," Balick says; it takes that long for drug companies to test, develop and get approval to market them.

Plotkin shies away from predicting a medical "magic bullet," stressing instead the role of potentially commercial plants in preserving Indian culture by providing valuable exports. The cultural dimension of this work—saving aboriginal societies by saving their ecosystems—is its most compelling. As Plotkin's colleague Brian Boom, of the New York Botanical Garden, puts it, "The satisfaction comes in seeing the barrier between men and nature dissolve, in discovering that Man and nature is the same story and not a different story."

The sun was already well above the trees fringing

the dark Sipaliwini River when we set off the next morning to collect plants. Plotkin was after two in particular—a fungus the Tiriós use to treat earaches, with potential as an antibiotic (p.101), and a reputedly potent hallucinogenic plant that has never been analyzed. If he found them he would pass them on to a laboratory for chemical analysis. Beyond his specific shopping list, he hoped to corroborate data he had gathered on previous trips.

He also wanted to build on his friendship with the three Tirió medicine men who guided us. The shamans, all between 55 and 65, practiced an art no longer honored by their children; not quite outcasts, they were regarded as quaintly old-fashioned, and they had no apprentices. "A lot of this work is just being with them, talking and learning from them," Plotkin explained. One goal of his visit was to persuade tribal leaders to assign a younger Tirió the job of recording the healer's knowledge before it was lost, an idea Plotkin called his "sorcerer's apprentice program."

With one breechcloth-clad shaman in the lead, the two others following and two younger, machete-wielding Indians providing the muscle, our procession wound along a foot-wide trail between trees and brush so thick that visibility extended only about six feet on either side. It was strangely silent—no monkey chatter or other animal sounds and only an occasional bird-call. "These are hunters," Plotkin said. "They've taken what's here." One shaman carried a bow and three long arrows just in case.

Plotkin plucked a leaf from a shrub bordering the trail. "They use this for stings," he said. "I was stung by wasps once and the shaman ground up a leaf and rubbed it on me. The bump was gone in five minutes." A few yards farther on, one of the Indians, a short muscular man of about 55 named Kaloshewuh, halted and pointed to another plant. "This is me," he said enigmatically, speaking in Sranan tongo. When Plotkin questioned him he explained that the plant had helped his mother give birth to him. Plotkin smiled as he inspected the plant. "Possibly a relaxant," he said. "They have a name for every plant in the forest, and they use about 300 of them as medicine."

We trooped on, the old men pausing to rest every few hundred yards. Plotkin kept up a stream of conversation, frequently provoking hoots of laughter. "You never just barge in and say 'Hand over your information,'" he said. "You talk about the weather and hunting and women and then when it comes up you pop the question you want to ask. It's usually not polite to be linear in the Western fashion." In his circuitous way he was nevertheless collecting and confirming Tirió medical lore at a rate of about one plant every ten minutes: the red sap of this plant is rubbed on the chests of children to relieve burns; the powdery leaves of that one relieve skin fungi; drink a glass a day of the juice extracted from another sweet-smelling plant and it "makes you skinny."

Soon after we resumed hiking he found the first of the items on his want list, the fungus used for earaches. Plotkin collected several samples, photographed them and dropped them into his pack. "How it works is up to the lab jockeys," he said. "I had trouble in chemistry class." He would collect more, he said, when he returned two months later during the rainy season. "The forest smells wonderful after it rains," he said. Even now it had the fresh, tangy plant aroma I associate with nurseries and farmers' markets.

The sun was high now, and its rays ricocheted off the thick-leafed branches high in the canopy. A shadowy phantom—maybe a monkey—flitted eerily across a branch. "Aha!" Plotkin cried suddenly, holding up a

Plants used by Amazonian Indians for medicinal purposes include (from left): *Marcgravia coriacea* (to treat centipede stings); *Cordia nodosa* (in tea, to alleviate fevers); *Potalia amara* (for snakebites).

flowering plant a shaman had handed him. His eyes shone. "I've been looking for this for six years, ever since I first saw it," he whooped. "It's used as a snakebite remedy in other parts of the Amazon, but here it's fever medicine. Hah!" He stuffed the samples in his bag. "For snakebites they boil the leaves and wash the bite with it."

Plotkin bantered with the Indians as we plodded back to the village. When one shaman told him he needed a new machete and knife, Plotkin asked if he wanted a car too. The medicine man laughed and said he'd never seen one but if he did, he might want one. "I respect them and I think they know it," he said. "I tell them that what they know is important, that they're smart in a lot of ways and that we don't have all the answers." He likes to quote a Surinamese proverb: "In the forest the Indian knows everything."

Rounding off a triumphant day, he gathered the hallucinogenic plant he was looking for on the walk back. "We'll have a conference on how it works tomorrow," he said. "It'll be the biggest meeting of medical minds since the last AMA convention."

Plotkin's passion for the natural world focused first on reptiles. As a teenager in New Orleans he longed for a driver's license not so he could date but so he could drive to where the water snakes were. His mother, a schoolteacher, moved the family washing machine into the kitchen to avoid awkward run-ins with the snakes and the feisty, six-foot-long alligator Mark kept in the backyard shed. He worked at the shoe store his father owned in the French Quarter, but his younger brother Norman, now an attorney in San Francisco, recalls that Mark's heart was never in footwear: "He'd be reading a magazine and not wearing socks. Would you buy shoes from a guy like that?"

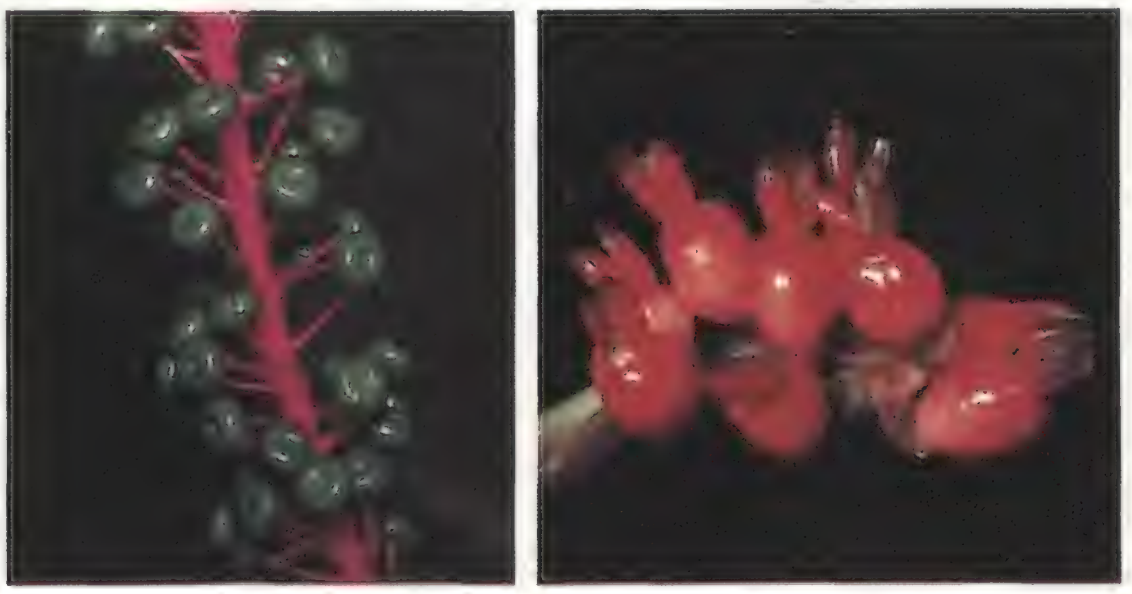
As an undersized but combative defensive lineman on his high school football team, Mark learned the importance of being noticed. "He taught me how to get my name called after a tackle even when I wasn't in on it," Norman remembers. "He'd jump on the pile and get up so the announcer could see his number and say 'Tackle by number 70, Plotkin.' "

Mark studied biology at the University of Pennsylvania for a year but dropped out to work with reptile specimens at Harvard's Museum of Comparative Zoology. Russell Mittermeier (SMITHSONIAN, December 1985), who as the World Wildlife Fund's vice president for science is now Plotkin's boss, remembers his first meeting with the 19-year-old Plotkin at Harvard: "Here was this little guy superexcited and enthusiastic about unpacking specimens in a room like a dungeon. We discovered that we both had a deep-seated desire to be an explorer."

But as a self-styled "museum bum" Mark lacked a focus for his yen to explore. It was only when he took a Harvard Extension course from pioneering ethnobotanist Richard E. Schultes that he found a frame for his ambition. Schultes, a conservation-minded scientist known to some as "Old Man Amazon," had spent decades studying the plants used by aboriginal Amazon people. "What turned me on was this picture he showed in class one day," Plotkin remembers. "Here was this straitlaced professor dressed like an Indian, wearing a painted mask. When he showed the slide he said very casually, 'The Indian on the right has a Harvard degree.' " Mark was hooked.

Ethnobiology combined the thrill of the exotic with the satisfaction of promoting conservation. Schultes encouraged him. "He questioned everything," the 73-year-old professor recalls. "He was always asking for the evidence, and that's what makes a first-rate scientist." Plotkin kept taking night-school courses, even-

Roots of shiny-leaved *Brunfelsia guianensis* are steeped in liquid drunk by shamans as a hallucinogen.



Phytolacca rivinoides (center) banishes head lice; tea from *Renealmia* (at right) fights coughs and colds.

A Tirió shaman, pausing here in a cassava patch, uses his machete to clear a path as he gathers plants.

A shaman demonstrates for Plotkin how a particular plant is shaken over a patient in a healing ritual.

tually amassing a bachelor's degree from Harvard, a master's from the Yale School of Forestry and a PhD from Tufts, but now he was hell-bent on seeing South America. He got his first chance in 1977, journeying to Suriname, French Guiana and Venezuela with Mittermeier in search of a rare lizard. "The Indians all knew Russ and shouted his name," he remembers, "and this was a guy from the South Bronx. I figured why not me?" Number 70 was on his way.

They called him pananakiri, *"the alien"*

By 1979, the year he received his Harvard degree at age 24, Plotkin's ardor had shifted permanently from scaly creatures to bush medicine. He zeroed in on Suriname because the rain forest there was still largely intact, little work had been done with the indigenous tribes and the Suriname forest service was conservation oriented. When he first flew into Kwamalasamutu in 1982 with his backpack and plant presses the Tiriós greeted him warily. They called him *pananakiri*, "the alien." At Harvard he had found an old map that divided the Indians of the region into two categories—"hostile" and "unfriendly."

"The men were all painted blue when I arrived because they always did that when a particular fruit was in season. I told them I wanted to learn and just sort of humped off into the forest." His first night was one of his worst. "I got lost on the way to my hut in the dark and the dogs were menacing me, and these are hunting dogs who are deliberately underfed. I finally went into a hut and a woman was there alone. I'd been told to stay away from the women, and she started to cry. All of a sudden a Tirió man painted blue came into the hut and stared at me. I understood Sranan tongo by then and he said, 'Are you lost?' Those were the sweetest words I ever heard."

Some of the Indians viewed the fur-faced alien with the duckwalk stride as comic relief. Crossing a stream with a band of nimble tribesmen on his first visit, Plotkin slipped from a rock and took an undignified plunge. "They thought that was the funniest thing they ever saw. There's one shaman who's been calling me 'white-man-who-fell-on-his-ass' ever since."

Plotkin borrowed his patient, oblique interviewing style from Schultes, who based his approach on the premise that "an Indian will seldom say no to a white man." The professor would often collect plants for days before his Indian guides would say anything. "Then they'd ask why I picked a particular one," he remembers. "I'd make up some disease and say we used it for whatever it was, elbow pain or something, and they'd say, 'No, no, it won't help that,' and eventually I'd get the explanation." But Plotkin's reliance on humor as a research aid was his own idea. "I like dealing

with people, and not all scientists do," he says. "I think a smile and a joke often get you farther."

The most important ethnobotanical skills are not taught in graduate school. "You need flexibility and patience and curiosity," Michael Balick says, "and an accepting attitude about other cultures so that when they say the spirits cause illness you understand that in their context it's true. You have to listen. And there aren't many who can do all that." When Plotkin is asked about the dangers of his job he says the chief peril is having to drink warm, sour cassava beer, which the Tiriós ferment with saliva. He has dined on anaconda ("awful"), a giant rat called paca ("best meat in the world") and "rice and tapir just like Mother used to make."

Plotkin knew that he had at least subconsciously absorbed part of Tirió culture the night he dreamed that a jaguar was staring into his hammock. Waking in a cold sweat, he described the dream to a shaman who reputedly could transform himself into a jaguar. "That was me," the shaman said knowingly. Not long after that the Tiriós stopped calling him "alien" in favor of *jako*, which means "brother."

By this time Plotkin was on the staff of both the Botanical Museum of Harvard University and the World Wildlife Fund; his old buddy Mittermeier had recruited him for WWF. Recently, he also became a collaborator in the Department of Botany at the Smithsonian's National Museum of Natural History. Like Mittermeier, a primate specialist, Plotkin is an example of a new species of conservation leader—a "biopolitician," in Mittermeier's word, equally comfortable doing field research in the rain forest, lobbying legislators or rousing the faithful at fundraisers. "He is the single best speaker in the conservation business, period," Mittermeier says of Plotkin. "And he's the one who put plant conservation on the map." Plotkin gives about 30 speeches a year and declines that many more invitations. He turns up in the pages of publications as diverse as the *Economist* and the *Washington Book Review*. Not surprisingly, such celebrity peeves some of his scientific colleagues. "I'll just say this," one allows anonymously, "when some of us see his picture in a magazine with his face painted we wonder, that's all, we just wonder."

A job that's always on his mind

The job he largely invented for himself obsesses him: "I go to sleep thinking about endangered palms and wake up thinking about how to raise money for an Indian tribe. It's a lifetime job. We have good data on maybe 10 percent of the Amazon plants now. In my lifetime we may get that up to, say, 40 percent. By the time I'm revising my memoirs the Tiriós will probably be wearing coats and ties."

The praise he values most comes from his friends in

The fungus *Gloeporus thelephroides*, an earache cure, is found growing on rotting logs in the forest.

Juice that has been squeezed from the fungus above is dripped into patient's ear through a curled leaf.

the tropics. "Mark is finding unknown resources which may have economic potential," says Stan Malone, a onetime Olympic sprinter who heads the Suriname Forest Service. "By broadening our knowledge he's helping both Suriname and science." Koita (p. 95), a young Tirió who has worked with him enough to pick up a little English, says simply, "Mark listens."

We gathered on the veranda of the missionary house soon after dark. The river rippled softly a hundred feet below us. A dog, probably stuck in a thatch wall, howled in the distance, and a solitary bird repeatedly sounded a call that seemed to say "tu-REE-oh," as if summoning the tribe to some nocturnal rendezvous.

Plotkin sat on a narrow bench with his notebook on his lap, surrounded by the three shamans, Koita, another adult and several children. One boy held a lantern at shoulder height, casting a pale yellow glow over the scene. The younger Indians looked at Plotkin almost adoringly. The conversation began circuitously, as always, but it soon moved to the main topic, the hallucinogenic plant Mark found. One shaman then spoke to Mark in Tirió, which he understands fairly well, and one of the other Indians translated into Sranan tongo to clarify the details.

"Drinking till you see the devil"

"The shaman drinks it until he sees the devil, wearing a breechcloth and carrying a war club." Mark nodded and wrote this down. The shaman, he was told, soaked the leaves and bark in cold water and drank the resultant cocktail.

Mark asked how long the potion was effective. The shamans looked somber. "You can't sleep with your wife for three days. You keep drinking it until the devil talks to you." When do you take it? "Only when an illness is so difficult that nothing will cure it. The devil tells you what medicine to use." This was a devil who could be reasoned with.

Two children wrapped their arms around the legs of one of the shamans. The old man smiled and tousled their black hair. Another boy squeezed next to Mark on the bench. From somewhere in the night came the incongruous sound of a tape recorder playing a Baptist hymn. Mark identified the plant as a member of the tobacco family, and said that other tribes in the western Amazon apparently used a related species. The Indians believe that serious illness comes from the spirit world, he explained. The medicine man takes the hallucinogen to commune with the spirits and find a cure. He closed his notebook.

The shamans got up to leave, their grandchildren trailing behind. Now Koita spoke up shyly. He said that the tribal leaders had only today assigned him to translate into Tirió Mark's list of all Tirió medicinal plants and their uses. He would be the sorcerer's apprentice. Plotkin leaned back and let a 50-candlepower grin spread over his face.

The next day was our last in the village. The plane was due to pick us up at 10 o'clock, but 10 became 1 and 1 turned into 3. Mark distributed our remaining food, toiletries and several cigarette lighters among the Indians. "They have a concept they call *e-pah-wah-nah*," he said. "It means continuing friendship. Friends give things to each other, but it's not a straight trade. You just do it naturally."

We toted our gear to the airstrip and waited for the plane in a patch of shade. It was Saturday, and most of the Tirió men were off hunting. "What I keep thinking," Mark said, "is that in their lifetime most of the men in this village made fire by rubbing sticks together." Now they wore wristwatches and eyeglasses. "I don't say we should stop bringing in Western medicine, but we ought to help them preserve their culture. Some of the old things are worth holding onto, primarily for their sake, and then for ours."

I asked what conclusions he had reached in his six years of work here. "The most important is that there are different realities," he replied, "and none is necessarily more valid. You can't discount anything, no matter how silly it might sound. And because you have a PhD and the other guy can't read, it doesn't mean you know more about botany than he does.

"Look," Mark went on, "I'm just a city boy whose father sold shoes, and now Indians hug me in the jungle. These are forest Indians, and they don't *do* that. That's the dream of every kid who grows up wanting to be a jungle explorer. Now Koita's going to be the apprentice. The real thrill is putting a page of botanical drawings in front of him and seeing his face light up with comprehension. We're bridging literate and preliterate cultures, and to me that boggles the mind."

The Cessna finally appeared in the northeast sky and touched down five minutes later. Thirty tense minutes ensued before the pilot could get the engine started for the return trip. The plane's cabin felt like a broiler in the midafternoon heat. The sorcerer's apprentice, who had passed up the hunting safari to say goodbye, shook our hands gravely.

A few minutes later we were airborne. The dust-brown clearing that was Kwamalasamutu became smaller and smaller until it was a tiny brown speck lost in the great green, and then it was gone and there was only the green, the endless, timeless, pitiless, life-giving, suffocating green of the rain forest.

Garbed in ceremonial headdress given him by the Tirió Indians, Mark Plotkin participates in a festival.

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By Israel Shenker

A sculptor's heaven on earth is Italy's city of holy stone

In the marble-white world of Pietrasanta, craftsmen transmute artists' visions by using 'just hands and tools, like Michelangelo'

Center of Pietrasanta glows on a balmy day, washed by autumnal light, dotted with belfries and churches.

The dust of marble penetrates everywhere. It covers floor and shelves and tables, sifts through every crack, cloaks each object, turns people into ghosts, stiffens the very air with white opacity. Hammer strikes chisel: more marble dust. The world is marble white.

This workshop world has been in the family for generations, and Enzo and Pasquino Pasquini reasonably enough have difficulty seeing beyond it. Enzo is 49 years old and the dust has eaten into his soul; when he is not working on a commission from a sculptor who wants his work copied, he hurries to fashion a sculpture of his own. His brother Pasquino, who is 61, has been working with marble, living and breathing the dust, since he was 11.

They are not alone. In Pietrasanta, a town of about 25,000 between Pisa and Carrara, near the coast of the Ligurian Sea in Italy, neighbors imbibe the same dust, the same passion. Pietrasanta—the name means "holy stone"—is not one of those tourist haunts that lure the traveler with luxury hotels and grand cuisine, or enchant the visitor with their beauty. It is a place celebrated among sculptors for its concentration on their art. Here sculptors find marble for their statues, workshops in which to make their molds, magnify their models and cast their bronzes. Pietrasanta enshrines the tradition of Michelangelo, Canova and Cellini; this is where sculptors find the artisans to guide and help them with their work.

"There are specialists of every kind," says sculptor Walter Dusenbery, who has a home in Pietrasanta as well as one in New York. "There are people who are saw specialists—specialists in taking off large pieces from blocks, specialists in taking off small pieces from blocks; specialists in drilling holes in stones; specialists in angel wings, specialists in babies, specialists in hands, specialists in feet, people who do flowing clothing, others who specialize in simple clothing; specialists with chisels, specialists with rasps; specialists in patina, specialists in polishing. You can find artisans in New York, but you can't find the whole environment; you can find industrial people who are well qualified, but you can't find the coordination available here. The American foundries are state of the art, but in America artisans tend to want to do it their own way. Here they're more flexible, and more responsive."

Using compass, calipers and a marble sculptor's pantograph, they work from models provided by sculptors who want clay and plaster copied in marble—often on a larger scale. Pasquino Pasquini, for instance, does the outer form of statues, the large lines; brother Enzo specializes in the decorative elements—flowers, fruit, hair. The brothers have made statues for churches, for gardens, for Los Angeles' Forest Lawn cemetery. They have copied glories of classical art, treasures of the Renaissance, and uncompromisingly abstract pieces

In Pietrasanta workshop, craftsman's gloves and Coke rest on a 17-foot replica of Michelangelo's *David*.

Photographs by Paul Solomon

At Tesconi foundry, a casting of a Fernand Léger work is shipped off to the Léger Museum in Biot, France.

clearly the products of the 20th century. A Hercules, 6 feet 10 inches tall, took them seven months—a true labor of Hercules. "When you're scaling up a statue you have to avoid fatigue and keep your wits about you," says Pasquino. "Sometimes there are surprises in the marble—there can be a defect in it. The hammer is a dangerous instrument: one wrong movement, a statue's finger breaks off, and in a moment the work of months is destroyed. If there's space between arm and body, that's another problem. Delicate parts won't take hammering. There are so many places where danger lurks, where we can't use power tools. Portraits are difficult: one false move banishes resemblance. Even when we finish the work our worries are not over; if we pick up a statue the wrong way it can break."

As they work, inspiration hovers just above them: plaster copies of anatomical detail from celebrated statues—an ear, an eye and the nose of Michelangelo's *David*, the head of the Madonna and the head of Christ from a Pietà antedating Michelangelo's. But the brothers themselves provide flesh-and-blood instruction for sculptors observing them at work. Says Nina Akamu, whose animal sculptures the Pasquinis have put into marble: "They're wonderful teachers, as well as wonderful craftsmen. There's passion in the work, and the more I talked to the brothers the more I realized how strong the passion was. It takes skill plus sensibility; it's mechanical, but it's more than mechanical."

"With machines you don't make sculpture," says Danilo Cervietti, who is now 77. His father earned his living at yet another Pietrasanta specialty—carefully packing statues for shipping—and Danilo grew up among marble workers. "You have to come into it when you're young," he suggests. Until age 30, he labored in an old workshop with no machines: "Just hands and hand tools, like Michelangelo."

Learning the painful way

When a marble worker is learning his trade, accidents happen. The hammer misses the chisel and hits the hand holding the chisel. "When the blood flows out, the mastery enters," marble workers say, and they disinfect the wound with what they call their penicillin—clean marble dust.

"The man who first attacks the block of marble has a heavy hand, then the one who does detail has a more delicate touch," Cervietti explains. "The work is not easy, but when you have confidence, the marble ceases to be hard—it's almost like butter. And you get used to the noise and dust. We call them the disturbances of progress."

Cervietti thrived on that punishing regime and eventually opened his own workshop and discovered

At the Cervietti workshop, craftsman Mirio Viviani surehandedly carves a section of a *Pietà* bound for a client in Taiwan. At left, hanging on the workshop's plaster model, is wooden pantograph used for copying.

his own new world. "Even if I had to give an extra blow with the hammer—work harder—it pleased me, since I was the owner." Two of his sons attended a local academy of art, and then—along with the third son who dispensed with academe—joined their father in the world of dust. The sons, in their 30s and 40s, are comparative striplings there; employees include a man of 82, another of 74, and half a dozen in their 50s.

When he can snatch a moment from the demands of marble, Cervietti retreats to secluded corners—worlds within worlds. In one obscure enclave where the din of progress is muted, he fashions his own works in clay—portraits both real and imaginary. They are not for sale or for display, and one follows another onto dusty shelves. Here, running his own race with unforgiving time, he finds supreme contentment, noting, "I do this to conquer age."

Plaster models and copies crowd an upper floor, an astonishing gallery where reproductions of celebrated works rest cheek by jowl with models by obscure sculptors. Downstairs, a copy of the *Victory of Samothrace* stands near *The Kiss* by Rodin, and a cast of Antonio Canova's erotic reclining statue of Napoleon's sister Pauline Borghese lies within sight of assorted chaste Pietàs. A large bust of Simón Bolívar flanks one of Winston Churchill. Popes descend in sacred line—John XXIII, Paul VI, John Paul II—mute in the presence of two secular Garibaldis as well as lots of Lincolns, bearded and unbearded. The Cervietti workshop is currently working on a marble reproduction of Michelangelo's *David*, to be shipped to Taiwan in June or July.

Every marble workshop in Pietrasanta seems prepared to boast of its *Davids*. Giuseppe Giannoni remembers the one that he and his workers took more than a year to make: it stood at least 15 feet high, and weighed eight tons. Standing in the courtyard, leaning companionably on another *David*—this one a 90-day wonder merely life-size—Giannoni figures aloud what he would charge for the next big *David*: 200,000 lire a day for a man's work, 500 days' work; 30 tons of marble at 900,000 lire a ton; 1.5 million lire for police escort in front and back of the truck carrying the original out-

Israel Shenker writes frequently for SMITHSONIAN, *most recently on Degas in October 1988 and on the sculptor Alberto Giacometti in September 1988.*

Ennio Navari, master of patinas like that in foreground, and an artist in his own right, paints in his studio.

Bertozzi workshop: American sculptor Ron Mehlman works with Ilario Bertozzi, grandson of owner.

Surrounded by specialized machinery and tools, Flavio Tartarelli cleans excess material off bronze.

size marble block from the mountains to the workshop, plus 7 million for packing. "That makes 135.5 million lire," he sums up, having included what he acknowledges as a generous profit. This comes out to $103,387, not taking into account a false move that may destroy the year's work.

Giannoni began learning the right moves at age 11, developing his craft beside his father, who had a marble workshop. In his own modest establishment, his two sons work with him. "Today it's difficult to get apprentices," he says with an air of resignation, as though accepting the mysteries of the great master sketch. "Rather than work on a block of marble, a young man may be better off pumping gas at a service station. Unless he has enthusiasm for this work, it's a waste of time and money. You take a big block of marble—it already costs millions [of lire]—and then you have to pay constant attention. We have the good fortune to attract the American sculptors. The ecclesiastic commissions have practically disappeared, so we have one fat year and one lean year, but not any very fat years. We're always poised on the knife's edge."

Giannoni cannot live by *David*s alone. "We made six *Pietà*s of Michelangelo," he says. "We made his tomb of Lorenzo de' Medici." A plaque in the facade above the Bar Michelangelo commemorates the artist's visit to Pietrasanta in 1518, during which he signed the contract authorizing him to design the tomb of Lorenzo. Fratricidal conflict was the stuff of daily life, and over the centuries Pietrasanta was ruled by Etruscans, Romans, bishops, and families from Pisa, Lucca, Milan, Genoa and Florence.

Sem Ghelardini appears to have accumulated the debris of every regime, though he dignifies it as "ordered disorder" going back merely to the 18th century. "We have a good deal of liberty in the scaling up," he suggests. "When the model is small, we're the ones who are responsible for not making errors. What is important is not just the general lines of the sculpture, but the surface—the skin."

It is part of refinishing process at the Mariani foundry. Huge cast head in background is part of a fountain.

American sculptor Helaine Blumenfeld examines a work in process at the studio of Sem Ghelardini.

Danish sculptor Jörgen-Haugen Sörensen works on his granite *Stone on Stone* at studio of Umberto Togni.

Pietrasanta's artisans are so expert that sometimes the artist appears superfluous. Danish sculptor Jörgen-Haugen Sörensen remembers a fountain he was commissioned to make. He entrusted the execution to Ghelardini's workshop. "Sem is never on time, and he prefers to make things without you—they are *better* without you. Anyway, I had to be away, and we made the piece by telephone. It's like a composer—you make the notes and 16 violins play for you.

"This is a town entirely for sculpture," Sörensen says. "There are half a dozen shops selling nothing but things to make sculpture with. All you have to do is go around the corner to find what you need. It takes a long time to learn how to work in stone, and you need help. It's romantic to think that you can carve a granite piece 5 meters high and 5 meters wide by yourself. If you buy a coffeepot and say 'I want that 15 meters high' and they do it—*you* are the sculptor."

"It's a legend that Michelangelo did his statues by himself," suggests sculptor Ivan Theimer, who lives in Paris and comes to Pietrasanta to work for two or three weeks at a time. "A painter can live in an attic, and with a few tubes of paint he can get on with his work. For a sculptor it's different. If Degas made statues of dancers 40 or 50 centimeters high he could do it all by himself, but for the larger things you need others. Especially if you want to paint, draw, do gouaches, watercolors, engravings, marbles and bronzes—it's impossible. It's like asking the orchestra conductor to play all the parts."

In Pietrasanta, Theimer finds his full complement of instrumentalists, and in a single day he can work in three or four workshops and foundries. "You can't do that in Paris," he said, "and you can't do it in New York, where you get in the car and it takes all day to go from one end of town to the other."

"It's the world you would imagine for yourself as a sculptor," suggests Helaine Blumenfeld, an American sculptor who lives in England and spends a good part of the year in Pietrasanta, where she metamorphoses

Red feet are for a statue of Hercules by Ivan Theimer, commissioned by city of Kassel, Germany.

Enzo Bartolucci chases piece created by the famed Chilean sculptor Fernando Botero, in striped shirt.

into "Elena." "I come here and all I do is work. There are no collectors, and no dealers to say 'We can't sell that piece.' The people who come to Pietrasanta come for an environment that gives them every support system. Every stage of what you're doing is made easy for you. If I need three men to move something, the three men are here."

The serious sculptors who work in Pietrasanta are not enchanted with amateurs, many of them Americans who flock here each summer to play the sculptor's part. Foundries—there are seven—remain open and shops prosper, but space is at a premium. Even regulars can at times find it difficult to get a table at Il Marzocco, the most popular restaurant in town.

Sculptor Howard Newman was prepared to put up with minor inconvenience, and moved to Pietrasanta for a year with his wife and two young children. "I had searched all of the United States for materials and tools—and they were all here," he says. "When I walked down the streets I saw people creating sculpture everywhere. The basic premise of Pietrasanta is that people are making a living. Serious people come here because they want to work. They don't come to discuss art. What happens is not that people are stimulated by others' work, but the atmosphere is of working, and that stimulates artists.

"The foundries have different personalities," Newman continues. "At Mariani's the people keep a certain distance from one another and respect each other's privacy. The Del Chiaro foundry has a very strong social element—a lot of people working close together. I have a more private attitude about my work. Tesconi is a very closed place. They tell you they don't want you to work with their artisans, and that's perfectly agreeable to some sculptors."

At Mariani's an elementary technique that the Italian artisans seek to master is making themselves understood. On a wooden board above his workbench one worker has printed: "How do you do? What is your name? Pleased to meet you."

Nearby, Loris Navari stands before a huge bronze head, alternately brushing onto it a chemical solution and applying the flame of a blowtorch. Under brush and fire the patina emerges. Sculptors and artisans in former days resigned themselves to the weather's patina, but also accelerated the process with wine or eggs or coffee, and even forced change by maturing the bronze in a cesspool. Applied chemistry is now the order of the day, and artisans create patina with metallic acids. Iron is the metal for brown, copper for green, silver for black. Specialists paint with potassium sulfate, ammonium sulfate, copper nitrate, ammonium nitrate, silver nitrate, ferric nitrate. "Blue is difficult and requires a combination of agents," Navari cautions. "You have to remember the taste of the client. Does the sculptor like a glistening surface, a surface marked by highlights, a dull surface? One sculptor wants the patina transparent, another wants a contrast between two parts of the statue." Loris worked for years beside his father, Ennio, master of patinas, who has

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The large adjoining workroom resounds to a splendid, undisguised cacophony of machines and tools turning, drilling, cutting, buffing, chasing, hoisting, welding, rasping, grinding, filing, polishing, beating, heating. Workers in blue jeans, many wearing earplugs, some with nose masks, and almost all with hats fashioned from newspapers, work confidently. Here stands one specialist beside a huge array of chisels he has made himself, filing and bending others to the shapes he requires. He applies himself to the delicate task of "chasing" an abstract bronze. The polished surface is almost imperceptibly flecked with imperfections. At each irregularity, with the confident air of a veteran surgeon, he makes a tiny incision, deftly hammers in a minuscule sliver of bronze. Almost miraculously, the transplant melds with its host, and is soon invisible in a surface become whole and impeccable. American sculptor Romolo Del Deo observes the artistry admiringly, then returns to his own work. He has learned a great deal from Mariani's workmen and does his own chasing.

Flavio Tartarelli, who has been at Mariani's for 30 years, lends a hand when sculptors run into trouble. Adept at every skill, he is, after all that time, still unfailingly enthusiastic about the work: "It's creative, and it's varied. It's not assembly-line work. It's not boring. There can be complications, but the difficulties can give us even more pleasure when we see the completed sculpture." At night he often lies awake mulling over technical difficulties encountered during the day's work. In his dreams he returns to problems he had 20 or 30 years earlier.

Mariani's specialists begin as apprentices at age 15, work in different parts of the foundry, and after about six months are asked which sector they prefer. "They must love what they're doing," says the foundry's Adolfo Agolini. "For ten years they work with older workers, and that's very expensive. Usually they specialize in one thing, but they must know more or less everything. We are about 30 here, and there are 5 or 6 workers who *can* do everything. From the beginning of a piece to the end are different stages. If one stage is done badly we lose the piece. We must do the mold properly or we have bad wax. If the wax is bad, the piece is bad. When we have the bronze it must be chiseled properly, and the patina must be done properly. No worker is unimportant. Each must do his work with a sense of responsibility. If a piece is no good we do it again."

At Blasco studio, a convivial group of European and American artists gather for their weekly lunch party.

High-tech comes to the foundry

In training for a career in the merchant marine, Agolini studied physics, chemistry, mathematics, electronics; later, after ditching life at sea, he landed at Mariani's. He initiated the use of ceramic-shell casting in the foundry, and then devised a vacuum system for which he received a patent. The ceramic, originally developed for the fusion of high-precision aircraft parts, can be heated to 2,700 degrees F and plunged into cold water without breaking. The wax model of a statue is dipped into successive baths of ceramic liquid until the desired shell thickness is obtained—usually ⅛ to ½ inch. The dried ceramic shell then goes into a kiln where the wax melts off. Molten bronze is poured into the hollow cavity once filled with wax. By using ceramics and vacuuming out excess gas and air, the work can be done more quickly, accurately and economically, but despite his innovations Agolini likes to put technology in its place: "I visited foundries in other countries, and I think the best thing here is that technology is not so important. The man is important. The important things are the hands and the brain."

"This is a world of force," says Giovanni Tesconi, who runs his family's foundry. "We're the only ones who still work with our hands, and it's not clean work. We're artisans and we don't mistake ourselves for the sculptors. And we're not businessmen. Paris and New York are all about selling. Pietrasanta is about work." Jean-Robert Ipoustéguy, Fernando Botero, Isamu Noguchi, Salvador Dali, Augustin Cardenas, Arnaldo and Giò Pomodoro have had works cast by Tesconi. The Shah of Iran ordered 1,500 copies of his own portrait in bronze, and 1,000 of his empress, Farah Diba. "That was business, not art," Tesconi concedes.

His great-grandfather established the foundry in 1885, and ownership passed eventually to Giovanni's father, Enrico, who is now 81 and whose life is bronze. "I began when I was weaned," he says. Notes Giovanni, "My father breathed the air of sculpture, and he made me work with plaster, with wax, with casting bronze. Before I did it full time I did it summers, all the time wishing that I could go to the beach instead. Our workers come here for any number of reasons. Sometimes it's simply because they can't get a job on the railroads or find work as a postman." Tesconi the younger sees his employees as representing two generations, two worlds: "One drinks Coca-Cola and the other drinks wine."

In the world that clings tenaciously to vintage habits is Mario Quadrelli, who is 53 and has been at Tesconi's since he was 16. "My grandfather was a sculptor in marble," he says. "We live with sculpture, with blocks of marble, with big statues. For us this work is as familiar as spaghetti."

His workmate, Antonio Lombardi, belongs to the other generation. He is 23 and started at Tesconi's simply because he needed a job. "When I came here I knew nothing," he says. "Now I, too, do it with feeling." A cross dangles from his neck, and he is especially keen on helping to produce figurative art. Ecologically minded, he wishes that at work he could breathe fresh air; perhaps he would be better off working outdoors as a stonemason, it is suggested. "And what about the winter?" demands Quadrelli. "Would you enjoy working outdoors then?"

Lombardi, he of the Coca-Cola generation, sidesteps the question and insists that the atmosphere of foundries and marble workshops is harmful to health; he speaks of workers dying young. Quadrelli quickly rejoins with examples of octogenarians still at work. Straight-faced, he adds: "You get your choice of dust in Pietrasanta—bronze or marble."

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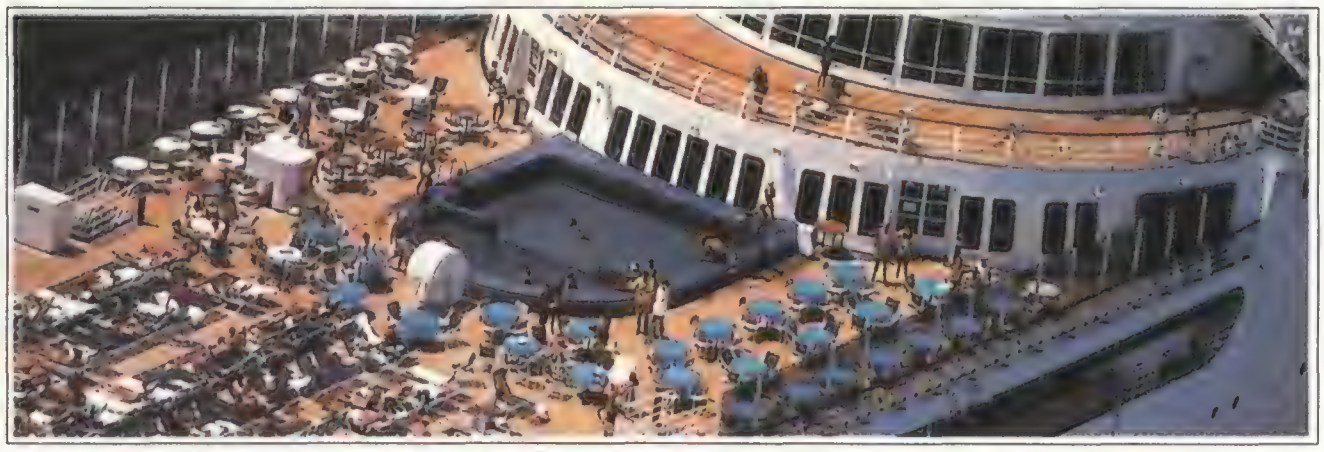

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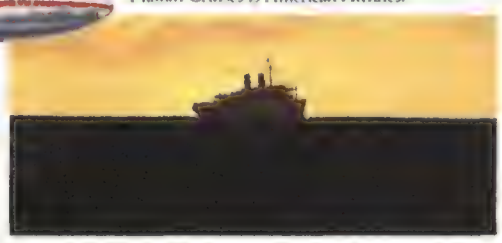

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Don't miss a thing.

Basking in pedestrian bustle, Whyte surveys some of his favorite turf: the intersection of 50th and Fifth. The site, a crossroads he has studied intensively, is prime territory for plotting foot-traffic patterns.

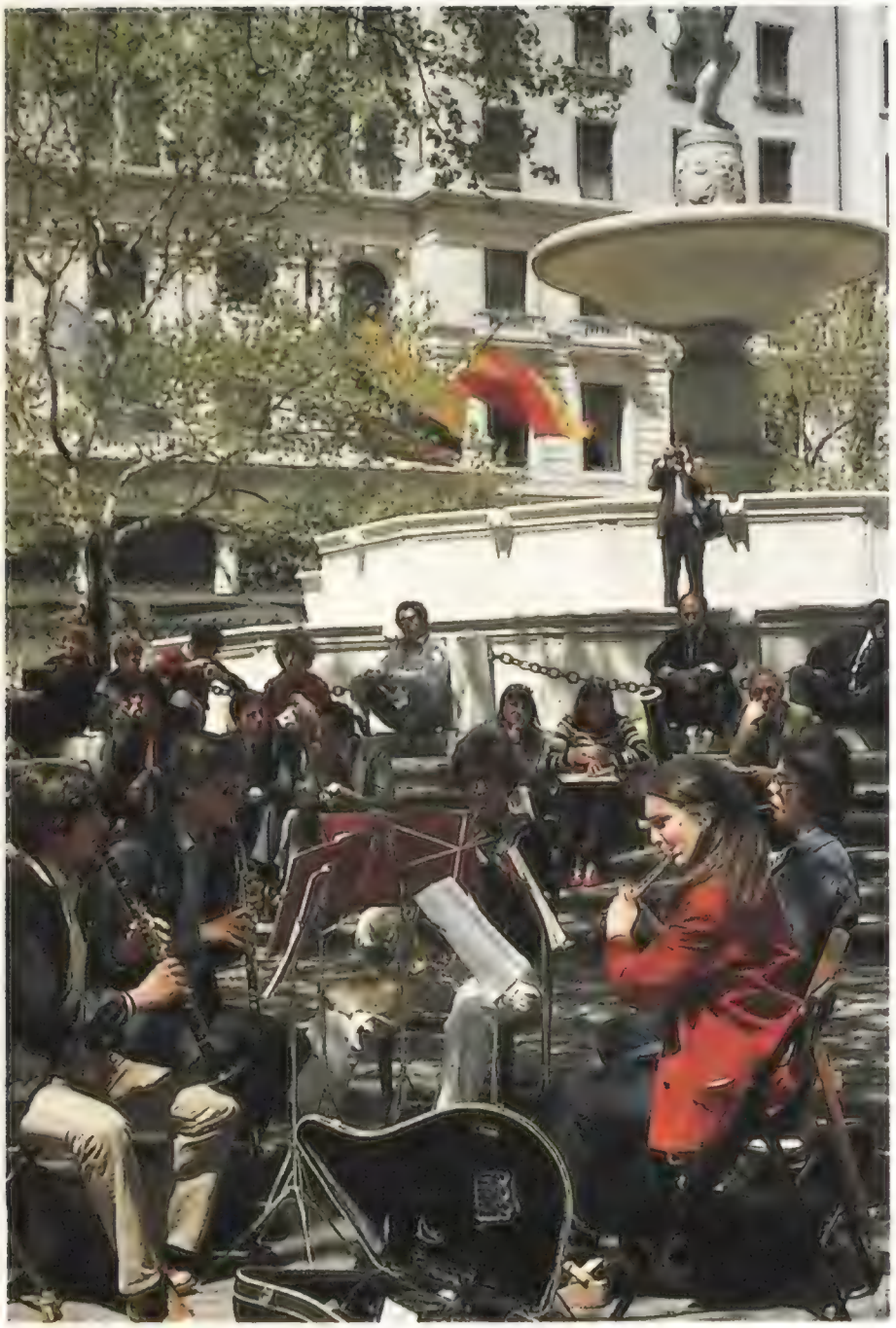
By Stephen S. Hall

Standing on those corners, watching all the folks go by

With tools from telephoto to tape measure, street-smart observer William H. Whyte documents and champions life at city center

"This is my block." From the backseat of a moving car, William H. Whyte shakes a gnarled finger, with great pleasure, toward one of the most narrow, congested, jostling, infuriating and vital street scenes in the world. Lexington Avenue at 59th Street, New York City. "It is the city in a distorted mirror, accentuated," he says, in his excited voice. "It's a place of edges. You have people living here. You have one of the great concentrations of movie theaters. And the subway. And two department stores, Bloomingdale's and Alexander's. All a jumble. That's why it's so lively, so round the clock. The biggest concentration of vendors. Pitchmen for phony causes. Battles of handbill passers. What a carnival!"

It is, in Whyte's urban-wise lingo, a "100-percent location." The sidewalk is exactly 12½ feet across (Whyte has measured it), and at peak rush hour periods, more than 5,000 pedestrians an hour bang and bustle by (he has measured that, too). On a typical day, the street is positively Dickensian in its collision of senses and sensibilities: shoppers lugging bags, workers toting briefcases, yuppies, beggars, vendors, pickpockets, all against a backdrop of honking horns and the



Street musicians, drawing a crowd of concertgoers, create an instant community at Grand Army Plaza.

Stripped of welcoming amenities (such as chairs), Lincoln Center seems empty and cheerless at midday.

smell of candied nuts and the voice of the newsstand man hawking the *New York Post* (today's dependably understated headline: "KILLER CADDY RAMS K-MART"). Urban planners love to show slides of this intersection, Whyte says, as documentary evidence of hell on earth. To Whyte, it is not only heavenly, but represents a vitality to which every city should aspire.

William Hollingsworth Whyte—"Holly" to his friends—can speak with such authority because he has spent a fair part of the past 20 years holed up in offices looking out on the street, stationing himself like a birder in a blind and observing the life below him. A self-taught sociologist and acclaimed author of *The Organization Man*, published in 1956, Whyte is perhaps our leading scholar of people and how they behave in urban environments. With students from Hunter College in New York, where he, as Distinguished Professor, taught urban sociology in 1970, he has recorded how people mingle, where they congregate, what they like and—just as important—what they don't.

Armed with data based on 16mm movies, photographic stills, time-lapse photographs, and a trusty tape measure for sidewalks and ledges, he has arrived at a series of provocative and perhaps unexpected conclusions. His original and eminently useful observations are spelled out in *City: Rediscovering Its Center*, published this month by Doubleday. Whyte's latest book, a wise and witty compendium of insights gleaned over two decades, redeems the urban experience.

This is not a man to mince words. Spry of tongue at age 71, though temporarily slowed down by recent heart surgery, Whyte is this day confined to an automotive tour of Manhattan. But there is nothing frail or pale about his commentary. The urban cacophony of Lexington rushes by. "See that streetscape?" he cackles. "That just makes their hair stand on end down at City

The unshaded plaza, or "glare box," as Whyte calls it, could be salvaged by adding "handsome big trees."

Metropolitan Museum of Art steps win accolades as "comfortable to negotiate, good to watch people from."

Planning." On Whyte's long, narrow face, dominated by bushy eyebrows and droll expressions, there is a look of (dare one say) pastoral contentment.

"The guts of my research is the way people—I hate the word 'interact'—but the way people interact in the city, and the effect of the physical environment," says Whyte. "I started this work in 1970, at the time of the high-water mark of the antidensity kick. You couldn't pick up a magazine or newspaper without seeing something about our crushing density. There were pictures of Dr. Calhoun and his mice in Bethesda. The rats commit suicide. Ergo, New York is no damn good. But in my work, you couldn't help but see that the conventional wisdom was not true."

Stephen S. Hall, who has written on subjects from inventors to gene splicing for SMITHSONIAN, *hones his street-wise skills in Greenwich Village.*

John B. Calhoun, actually a researcher at the National Institute of Mental Health, conducted a series of experiments with mice in the 1960s, suggesting that their behavior became more neurotic as their living conditions became more crowded. Unlike mice, Whyte discovered, people can adjust to and even gravitate toward high density. They thrive on it. In the course of his research, Whyte concluded that other bits of conventional wisdom about the urban experience didn't hold up to scrutiny, either. There are a wealth of these counterintuitive conclusions to be found in *City,* but perhaps the most important refutes the density argument. "Despite what people say," Whyte argues, "the thing that attracts them most is people."

As anyone who has seen him in action on behalf of the Municipal Art Society or the New York Landmarks Conservancy can attest, Whyte is a man of strong likes and dislikes. He defends street vendors, street enter-

From his camera's-eye vantage point, Whyte has recorded everyday comings and goings at 59th Street and Lexington since the '60s. His patient stakeouts and time-lapse studies have allowed him to film the small dramas of the city's street life. A minor atrocity (below) that did not escape notice: the demise of a convenient perch at a midtown bank. The building ledges made a great place to hang out, until "management took action" and installed rows of forbidding spikes.

tainers, outdoor seating (benches, ledges, steps and, especially, movable chairs), the city grid plan and gentrification. (The chief threat to housing for the poor, he argues, is not the movement of the middle class to deteriorating neighborhoods, but "landlords who let buildings rot" and the federal government's failure to subsidize housing.) He inveighs against land-gobbling downtown parking lots (particularly crippling in small cities), blank walls, malls, shops with no street access, "mega-structures" (self-contained hotel-office complexes like Detroit's Renaissance Center), and the way cities deal with "undesirables"—making an urban park so undesirable that others won't use it, either. He employs deep passions in the fight for urban amenities; as he says in *City*, "I will not feign neutrality."

Nonetheless, Whyte attempts to bring scientific rigor to his work. He is routinely described as an urban sociologist, but one is tempted to see in his activities a quality almost Darwinian in its patience, its curiosity and its astute analysis: he reminds one of a biologist peering into an urban tide pool and documenting the scuttling streetwise crustaceans, or of a human ornithologist perhaps. He smiles at the suggestion and says he prefers the simple word "observer."

"Quite a lot of birds out already," he says, motioning toward the open space in front of the Metropolitan Museum of Art as the car starts down Fifth Avenue. "This is a great space, a tremendously rich scene. They seed activity here by putting out chairs." Whyte is big on chairs. Obsessed, you might say. One of his principal conclusions, deceptively unimpressive, is that "people tend to sit most where there are places to sit." It seems like a trivial observation, until you begin to see vast parts of the urban landscape that are underused or empty. One key reason, which has escaped many well-remunerated architects, city planners and developers, is that there is no place to sit.

Off Central Park: a magical convergence

"We're fast approaching a wonderful urban complex," he announces a few minutes later, "one of the greatest in the world. Grand Army Plaza." This is the magical convergence of Central Park South and Fifth Avenue, anchored by the park, monitored by the Plaza Hotel, with the Pulitzer Fountain as centerpiece and with reliably accomplished street musicians as the "house band." "Most people think it's a tourist place. It's not. The office work force uses it. A town that is really good is one that is good to its people, who regularly use it, inside and out.

"And that is why," he says, turning to the General Motors Building across the street, "this is such a terrible mistake." The building's "lousy sunken plaza" has given Whyte, and other critics, a case of intellectual heartburn. Back in 1961, city planners enacted legislation called "incentive zoning." It permitted developers to add extra stories to skyscrapers if they in turn provided outdoor parks or plazas for public use. It sounded like a good idea, but in Whyte's opinion a lot of the public space was designed as an afterthought and used accordingly. "Planners pled time after time with the GM architects, 'For God's sake, don't sink that plaza.' They went ahead and did it, and now it is little used."

And so Whyte organized something called the Street Life Project to determine what made a good urban space—what people like, what they use and why certain plazas, like GM's, go unused. The group's observations resulted in three seemingly innocuous commercial zoning provisions, enacted since the '70s, that Whyte believes have helped restore the essence of a lively street experience. One, every new building must devote its street-level area to retail use (no cavernous lobbies). Two, the street-level shops must be directly accessible (no "downtown malls," which turn their back to the street). And three, street-level windows must be transparent (no fortresslike blank walls).

In demand: a touch of glitz

Trump Tower rears its gilded, gaudy head on the left. "I like it," Whyte pronounces. "It's vulgar as hell. I could fault it on a lot of things. There's no seating: they got away with murder on that. But it's got that bad taste. That's the trouble with so many 'ideal' streetscapes. You see, they're the result of studies. It's all in such goddamn good taste! You need a touch of glitz. You need something like Trump Tower.

"Ah," he continues, "here's my 100-percent corner, right here." He nods toward the corner of 50th Street and Fifth Avenue. It is the kind of place, Whyte explains in his book, where people have "100-percent conversations"—conversations so serendipitous, so spirited, so engrossing, that their perpetrators stand right in the flow of pedestrian traffic. Observing from hidden perches, Whyte mapped the locations of these conversations and noticed that most take place "*right smack* in the middle of the pedestrian traffic stream." Not only that, people who begin conversations in the fringe drift, by their own choice, right into the flow. It illustrates one of Whyte's more profound theses: contrary to the urge for isolation and escape, people have what he calls the "tendency to self-congestion."

Of course, when congestion is caused by street musicians or sidewalk vendors, the merchants on Fifth Avenue and elsewhere suddenly lose their ardor for free enterprise, to say nothing of urban sociology, and call the police. For that and other reasons, Whyte believes merchants contribute mightily to the "dullification" of the cityscape. "If they had their way, this place would

Only the most extreme conditions—frigid winters in Minnesota, for instance—can justify a skyway for Whyte. As pedestrians are removed to upper reaches, the deserted streets below become "deader than ever."

be so dull," he complains. "They hate vendors. They hate performers. My God, they should thank their lucky stars that we have this corps of screwballs and entertainers to make the place really very exciting."

You would think that a person of such shamelessly urban jingoism would have been born and bred in the big city. Holly Whyte's first taste of the grid, however, came in the small market town of West Chester, Pennsylvania, where he was born in 1917. The grid of West Chester, just beyond the suburban fringe of Philadelphia in those days, was modest and contained, and Whyte's family lived one block from the cornfields. Yet it had a *center*, and Whyte now sees the town center—whether county seat or soaring metropolis—as a crucial point of social convergence and coherence. By contrast, centerless suburbs and low-density metropolitan sprawl—one of his favorite examples of the latter is the Route 1 corridor outside Princeton, New Jersey—are "extraordinarily wasteful." They make poor use of land resources; no one walks; there is no center, and thus no focus for interaction. As Whyte insists, one of the great human urges is to move toward the center.

Whyte knows Princeton because he went to school there. He graduated as an English major in 1939 and then worked for two years as a salesman trained by the "Vicks School of Applied Merchandising," peddling Vicks VapoRub on the road. He doesn't exactly say that the Vicks folks were grueling, but—well, yes, he does. "The Marines were a breeze compared to Vicks," he allows with cheery exaggeration. He saw action at Guadalcanal, finished his hitch as a chronicler of that campaign and then joined *Fortune* magazine as a writer in 1946.

A book that became "a modern classic"

There, Whyte was given the time and freedom to pursue broad thematic stories about postwar social trends. It was a series about the sociology of the emerging corporate managerial class (and its postwar flight to tract-housing suburbs) that resulted in his 1956 *The Organization Man*—a book that "survives as a modern classic," Robert J. Samuelson wrote not long ago in *Newsweek*, "because it captures a permanent part of our social condition." In 1958, in an essay in *The Exploding Metropolis*, Whyte considered the problem of urban sprawl and noted, rather presciently, that "much more of this kind of progress and we shall have the paradox of prosperity lowering our real standard of living." The issue of urban sprawl begat an interest in land use and conservation, which in turn piqued his interest in urban density, and the question of density brought him back to the city center.

After leaving *Fortune* in 1959, Whyte took an increasingly active role in urban affairs, consulting for

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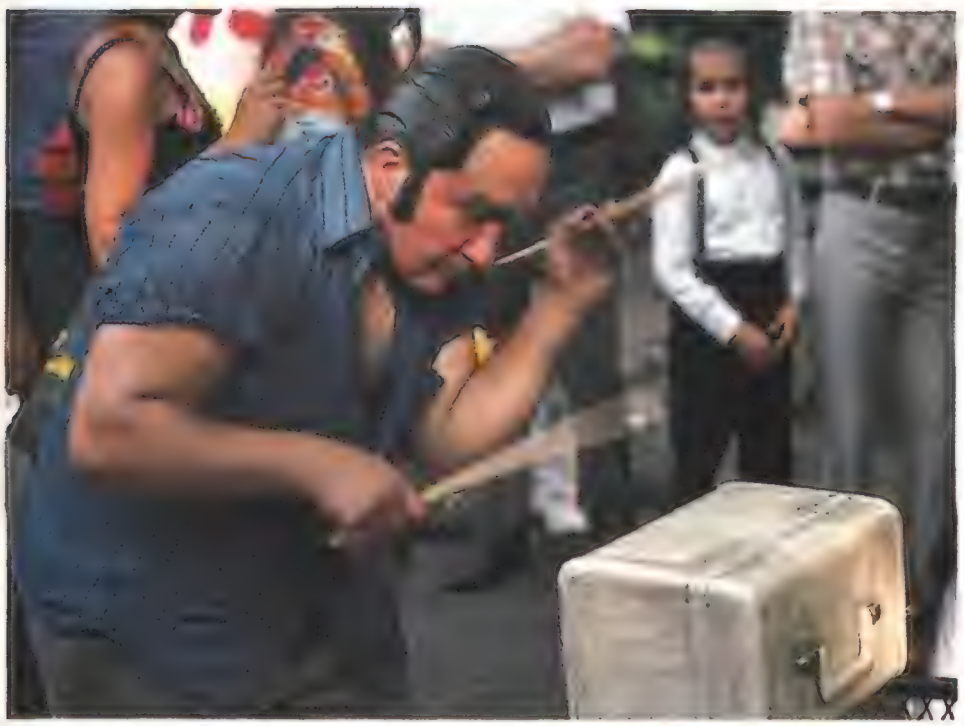

Over the years, Whyte has chronicled a cast of street characters: friends settled in for chess, a drummer who devises instruments from his scavenged finds, a button-and-placard-studded neighborhood gadfly.

cities, proposing zoning legislation, battling ill-conceived projects and raising well-intentioned hell with the powers that be. Although best known to the public for *The Organization Man,* he has written a number of feisty and influential tracts on urban planning, notably *The Social Life of Small Urban Spaces* (published in 1980). "He's certainly done more than any single person to tell us how cities actually work, especially how New York City works," says Brendan Gill of the Municipal Art Society. "His work has been pretty revolutionary, and some of it has made its way into legislation."

Whyte began to study Lexington Avenue as a kind of hobby and grew to see that it captured some quintessential human vitality missing from suburbs and from suburban malls. That and subsequent observation has also produced lovely nuggets of eccentric data.

He found, for example, that the single most important step to take in attracting people to a location is to make food available. While the mayor of New York recently sought to curtail streetside catering, Whyte says bring on more. "The fare is surprisingly good," he writes in *City,* "and far superior to that of the franchised fast-food outlets."

Pinpointing parking offenders

Whyte also discovered an interesting thing about downtown parking when he proposed that a lane of Lexington Avenue be closed and the sidewalk widened. Merchants, as they always do, screamed that the loss of parking would cripple their business. Whyte and his researchers hauled out the time-lapse cameras and discovered that more than two-thirds of city spaces were hogged for all-day parking. The culprits, most likely, were merchants and their employees. "Look at that urban space!" Whyte will cry, pointing out a parking spot. "If you calculate the true rent that should be charged for that, it's unbelievable!"

During a survey of midtown-Manhattan streets, 36 miles in all, Whyte and company counted a total of 4,031 vehicles parked. Two thousand of them were parked illegally; only 22 had been ticketed. Moreover, on *every single block* at least one lane of traffic was illegally blocked by a parked vehicle.

And Whyte dispelled the myth of the careless slob, observing that people are quite good about throwing away litter—*if* there is a place to throw it. In studying the "daily life of a trash container," Whyte discovered that scavengers actually play a useful role—their scavenging helps settle the contents of trash containers, increasing their capacity. These containers are visited, Whyte notes, by about one scavenger per hour.

Studying Lexington Avenue's horrific traffic, Whyte's team discovered that buses make up 4 percent of the vehicles, but carry 37 percent of all passengers. Private

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Paley Park, tucked in a space off 53d Street, is one place where Whyte got his wish list—movable chairs (and lots of them), ledges for sitting, a measure of sunlight, snack counter, even a waterwall. The result: a space people use.

cars average 1.6 passengers. The make of car with the lowest occupant-to-vehicle ratio was a Cadillac (1.1).

They documented our sedentary tendencies as well. People, it seems, are unwilling to walk more than three blocks from their place of work to an urban park or plaza. "If you could convince or somehow train Americans to lengthen their effective walking radius by *one block*, it would be revolutionary!" he says. It would allow parking lots to be moved farther from the center and free it from what he considers an "alien land use."

One of Whyte's greatest contributions is his analysis of the flight of industry from New York City. This has always been interpreted as a vote of no confidence in a city that is too expensive, too crime-ridden, too dirty, too full of hassles—a vote of no confidence in cities in general. Whyte's data suggest that, quite the contrary, cities should simply say, "Good riddance."

Whyte started out by looking at the 74 "*Fortune* 500" industrial companies based in New York during the 1960s. He then compared their location and performance in subsequent years. By 1976, some 38 corporations had fled New York. Upon further examination, 17 of the 38 had fallen victim to various consolidations—"in no case," Whyte adds, "as the dominant partner." Of the remaining 22 companies, Whyte found that when market valuation was charted over 11 years, corporate migrants were out-performed three-fold by companies that remained in New York. "Somewhere, there's a cause and effect," Whyte insists. "These migrant companies are losers."

A cunning bit of exurban snooping rounds out this story. Where did these corporations relocate, Whyte wondered, in their high-minded quest for lower crime and better amenities? It turns out that 31 of the 38 corporations moved within eight miles of the home of their chief executive officer.

So Whyte casts a dubious eye on corporate rationalizations, both large and small. Indeed, as the car proceeds past the corner of Madison and East 57th Street, he suddenly snarls, "Fie on them!" and shakes a finger at what appears to be an innocuous bank building. What has provoked this archaic, vituperative outburst?

It has to do with one of Whyte's pet themes (the need for ledges and other surfaces for sitting) and one of his pet peeves (what merchants and businesses do to discourage same). This particular bank building once had a very nice ledge crowded with lunchtime people-watchers. "A place where people could sit," Whyte says wistfully. "It had everything." So, to root out a seditious lot of brown-baggers, the bank installed spikes.

"The powers that be can get away with just about anything in New York," Whyte says. "But people will figure out how to make a place habitable." That's a theme that recurs in Whyte's theories about why good streets, good centers and good cities work the way they do. He refers to "self-confident" cities—cities that have strong leadership, that put innovation and human needs above the conservative impulses of commerce.

"There is no such thing as one all-purpose model city," he says. "The important thing is that so many cities have one helluva lot of good ideas to offer." He mentions Portland with its Pioneer Courthouse Square and Ira Keller Fountain, Seattle's fight to save the Pike Place Market, Boston's rescue of Faneuil Hall, Columbus and its state Capitol grounds; Philadelphia and Pittsburgh, too, win high marks. "You see," he says,

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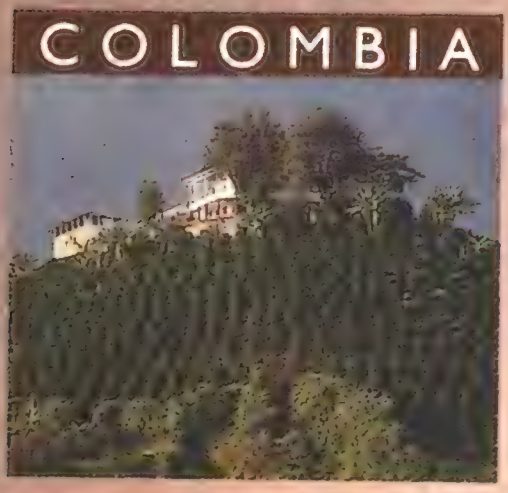

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"there's a common denominator here: good leadership." These are towns, in short, that have rediscovered their souls in the city center.

Compromised city cores? Topeka comes to mind, with all its downtown parking lots, as does Houston, Atlanta and Albuquerque (the capital of blank walls). With good intention or ill, they have conspired to deaden their centers with parking lots, skywalks, malls, sunken plazas, blank walls. All the things, in short, that draw people away from the street.

If Whyte's research has shown anything, it is that little things can make a big difference. Chairs. Trees. A water fountain. The things that developers add as garnish to architectural sketches. Far from garnish, people clearly like and use them. In fact, Whyte argues, they are the single most important component in determining whether a public space will be used or not.

It is midday, and the car has stopped in front of the vast amphitheater of Lincoln Center. Whyte stares out at this travertine desert, mumbles oaths about its painfully high footcandles of light during the day and shakes his head. He still gets steamed about the Lincoln Center drinking fountain. First, you can hardly find it because it's located behind the bandstand. Second, it doesn't work. "Going on eight years now," he laments.

Some time ago, Whyte tried to convince the Lincoln Center bureaucracy to put in a couple of trees and chairs to break up the space. He stopped short of recommending what he calls "major building changes" (it's hard to imagine architects like Philip Johnson going along with that, although critics Paul Goldberger and Jane Jacobs share Whyte's distaste for the design). Whyte did insist on chairs. Lincoln Center complied, grudgingly, for a while, but now provides them only on special occasions. Except for a few minutes before and after a performance, the space has all the warmth and hubbub of a De Chirico painting, with none of the allure and mystery.

"If you get this at the right time of day," Whyte says, "it looks gorgeous. See, the fat cats and the board of trustees never see it in the glare of noon, only at night. Now it looks sort of crummy. And yet, it wouldn't take much to make it look good."

Whyte believes this precisely because of the success of two other small urban parks in New York, Paley Park (on East 53d Street) and Greenacre Park (on East 51st). They are tiny spaces, yet among the city's most heavily used parks. Paley Park, the prototype, opened in 1967 and is outfitted with a waterfall, chairs and tables and sittable ledges, and a snack counter. Whyte calls it the "most significant new urban space *anywhere*." Greenacre Park represents a particularly delicious triumph, for civic groups forced a developer to lop three planned stories off a nearby high-rise (at a cost of $25 million) because it would have cast a shadow over the park for 25 minutes during the day. Given the absence of large tracts of land in city centers, Whyte believes the battle for a more amenable city center must be waged over these small but highly used spaces.

The question underlying all these "little successes" is: Will the center hold? Mr. Whyte, not surprisingly, has an opinion about that. "I think it will hold," he says. "It's important, even for a suburb, to have a place to relate to in the center. This is not something that is going to be orchestrated by planning commissions. It's the net effect of wise policies. The center that holds is made up of a lot of things, including corporations who elect to stay in the city. It's a place that regains in new terms the variety that once it had."

The car makes its way up Madison Avenue, a street that has reinvented itself in just such a way. Brownstones that once housed well-to-do families decades ago have now been regrouped into a prosperous bazaar, opulence behind glass, with shops both on the street level and above ("Look at the second-storiness!" Whyte cries). There is rhythm to the buildings, excitement for the eye. "Now look at that!" urges Holly Whyte, pointing out a particularly smashing row of shops. "You don't get *that* out in the suburbs." About that he is 100-percent right.

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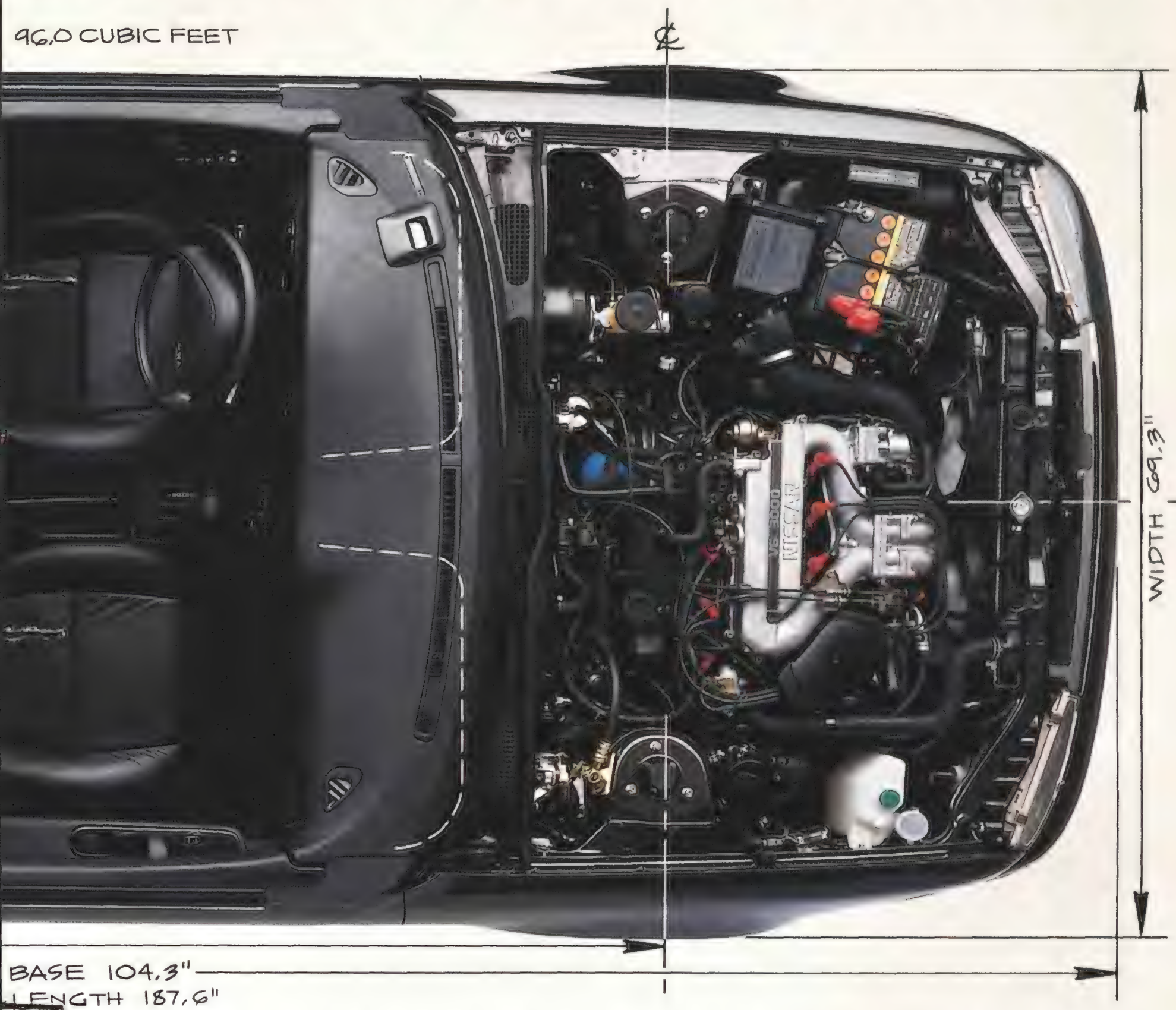

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By Scott McCredie

They're still slimy, but naked snails are finding new friends

The Paul Bunyans among slugs are winning cult status in the Pacific Northwest, and the interest of medical and computer scientists

A banana slug, *Ariolimax columbianus*, confronts the camera. Note eyespots on its two upper tentacles.

In the Pacific Northwest, a curious thing often happens when boys spot a slug. They sprinkle salt on the hapless creature until it writhes and dies.

You needn't dig very deep to discover the roots of this hostility. Northwest gardeners and farmers have been virtually at war with slugs for nearly a century. Ever since the first slug was caught eating a precious plant, people have counterattacked with an arsenal of poisons and deterrents.

In the past few years, however, passions seem to have cooled. Slugs have been commended in the press lately for their valuable role in scientific research. In 1986, a slug was chosen by the University of California, Santa Cruz as the school mascot. And today, with festivals, zany postcards and T-shirts, a slug club, cuddly dolls and carved replicas, slugs are beginning to achieve a sort of cult status.

In search of the real thing, I recently went slug hunting at dusk outside a beachside cabin on the Strait of Juan de Fuca. There I found several six-inch-long banana slugs (*Ariolimax columbianus*), one of the largest species in North America and the world, emerging from dense woods to feed. Few of them are yellow. Their shape and size are bananalike, but most range from olive green to black. The common name is borrowed from a closely related species that lives in Northern California and whose predominant color is yellow. A more appropriate name for the Northwest species might be the "unripe banana slug" or even the "green apple slug"—anything but its present one.

A rare slug, *Prophysaon foliolatum*, climbs the stalk of a wild mushroom, one of its favorite foods.

A particularly large, dark-green slug caught my eye, and I bent to study it. I watched its small breathing hole, the pneumostome, located on the side and toward the front, open and close. Two pairs of tentacles were extended in front like the canes of a blind man, waving in slow motion. When they made contact with a leaf or a stick, the tentacles would retract slightly, as if in surprise, then push out again. I could just make out the black dots on the end of its two largest tentacles, simple eyes with which the slug can sense light and dark. The lower, smaller pair of tentacles are thought to be scent receptors.

I touched the tentacles gently with a twig. The slug's head disappeared under a flap of skin called the mantle, located where the shell would be on a snail. In a few seconds, the tips of the eye tentacles peered out cautiously. Then, convinced the coast was clear, the entire head emerged slowly and the slug continued its foray.

In ancient times, the relationship between slugs and humans was friendly. Vi Hilbert, an elder of the Upper Skagit tribe in Washington State, says that the Indians of the region thought of slugs as "powerful doctors, helpful spirits." Baked into a powder and mixed with bear grease, slugs were applied to a newborn baby's umbilical wound to help it heal. Slime from slugs

Photographs by Terry Domico

Slugs are finding new friends

Physiologist Ingrith Deyrup-Olsen of the University of Washington holds a typically colored banana slug.

was used to take the sting out of nettle burns and mosquito bites. Slugs were even hallowed in myths.

But with the coming of white people, the slugs' lot in life began to change. In 1841, the United States Exploring Expedition sailed into Puget Sound to map the area and collect specimens of its flora and fauna. Among its discoveries was the banana slug, which, according to one observer, "grows to the length of six inches, but shrinks to a third of that size in alcohol."

If the expedition's collectors had looked further they would have found more impressive specimens. A full-grown banana slug can be up to a foot long, and some say there are so many in the woods of western Washington that it should be named the state animal. The damp, maritime climate of the coastal region between Northern California and southeastern Alaska makes it one of the world's four or five premier habitats for slugs, a fact that doesn't please many gardeners.

Of the dozen or so other slug species living in the Northwest, several are as fond of garden plants as are the people who nurture them. During the spring, platoons of these slugs stage nightly raids on vegetable gardens, flower beds and agricultural crops. With their tonguelike radulas, covered with tens of thousands of tiny teeth, slugs rasp away new shoots as well as mature plants. They can cause enormous damage; in particularly wet years, slugs can destroy up to 75 percent of western Washington's strawberry crop.

And the home front is no less vulnerable. "If you plant a row of marigolds one day," says Ken Plante of Seattle, "and don't put any slug bait out, you can wake up the next morning and literally there'll be nothing left of them." Plante, who manages the Seattle Garden Center, hears a lot of complaints about slugs, usually in the spring and fall when they're most active. He directs slug-weary gardeners to a stack of shelves toward the rear of the store.

Heavy artillery in the war on slugs

Here, the gardeners can choose from a variety of weapons. There are two types of deterrent fences. One is made of copper and gives off a mild electric shock as slugs attempt to scale it. The other irritates their skin with granules of salt. There's also a slew of baited poisons (gardeners must shop elsewhere for that old standby, a saucer full of beer).

The active ingredient of most commercial slug poisons is a substance called metaldehyde, which has the same effect on slugs as salt does. It overstimulates the slugs' skin glands, causing them to secrete a large—and potentially lethal—percentage of their body fluids. Much of the time, however, it does not kill. Slugs can survive losses of up to 50 percent of their body moisture (humans, on the other hand, will die if they lose more

Ken Bakeman, creator of carved, lacquered "pet slugs," first had to overcome the resistance of store owners.

At the races, a contestant creates a patch of shade to entice his entry into moving less sluggishly.

than about 15 percent). If slugs ingest the poison while it's raining or when the air is humid, they can absorb moisture back through their skin, reconstituting themselves like freeze-dried strawberries. Thus metaldehyde works best when the air is dry, a circumstance not very likely during slug season.

Slugs are also hard to control because of their reproductive ability. In some species, individuals reach sexual maturity within a few months after hatching and can lay hundreds of eggs a year. Although hermaphroditic, slugs rely on cross-fertilization, with couples sometimes engaging in animated mating rituals that can last more than a day. Finally, slugs have few natural predators (beetles, moles, garter snakes, ducks and shrews) to keep them in check.

Although gardeners buy all kinds of slug poisons and deterrents each spring, one of the Garden Center's other best-sellers, ironically, is something called "My Pet Slug." These are wooden replicas of *Limax maximus*, one of the largest and peskiest garden slugs, hand-carved by Ken Bakeman and staff. With their lacquer finish and nylon tentacles, the replicas look so real you'd expect them to start inching hungrily toward the nearest plant. Instead, they'll be bought as gags.

Confronted by a slug, a mollusk whose relatives are oysters, clams, snails and octopuses, people usually display curled lips, wrinkled noses and other signs of disgust. What is it that makes a slug repulsive while snails, virtually identical to slugs except for their shell, are considered cute or charming or eminently edible?

Perhaps it has something to do with the axiom about clothes making the man. Snails wear a handsome calcium suit, a shell that reminds us of tide-pool treasures. Slugs, on the other hand, are snails that have lost their outer shells, and while that may be an evolutionary advancement it's a sartorial disaster.

Scott McCredie, a Seattle-based writer, says he has stopped using salt on food—and on slugs in his garden. This is his first appearance in SMITHSONIAN.

Species introduced from Central Europe, *Arion ater*, is now a major pest at Washington farms and gardens.

P. foliolatum, like some lizards, can amputate part of its tail when necessary to divert a predator.

Limax maximus, another foreign species, does much of the harm for which native banana slugs are blamed.

Shells provide snails quick refuge from predators, but limit their range to areas with sufficient calcium in the soil. And the shell's size and hardness reduce the snail's mobility, exposing it to predators who know how to crack its armor. Slugs can exist in places that don't have much calcium in the plants and soil, like the Pacific Northwest. They make up for the lack of a shell with an uncanny ability to squeeze into the tiniest crevices, cracks and holes to seek shelter. When necessary, a slug can stretch its body as much as 11 times its normal length, pouring itself like liquid plastic into improbably small openings.

Disgusting—but consider the alternative

Not only do slugs appear naked to the world, they're covered by a shiny material that renders them vile to humans and unpalatable to all but a few animals. That substance, of course, is mucus, which protects the living cells of practically all animals, yet is something most people abhor.

One person who isn't put off by mucus is Ingrith Deyrup-Olsen, a physiologist at the University of Washington. A student of slugs for the past eight years, Deyrup-Olsen has focused on their mucus for the last three. The mechanism that produces and regulates mucus in slugs is remarkably similar to the human system. By studying slug mucus, she hopes to shed light on human diseases that involve a malfunction of the mucus-producing mechanism. One is cystic fibrosis, which affects about 30,000 people in the United States. Its primary characteristic is the production of a mucus in the lungs that is highly susceptible to infection. This leads to clogging of the respiratory surface and can eventually suffocate a victim.

Deyrup-Olsen chose slugs for her study because their mucus is easier to obtain than that of other animals, and she has come to admire her subjects. Unlike that of most terrestrial creatures, she says, a slug's skin is a "living surface" only one layer of cells thick. Mucus coats the skin to protect it from invasion by bacteria and mold. Human skin, on the other hand, is composed of many layers of dead cells (SMITHSONIAN, May 1988), which protect the living tissues underneath. "I can only think of mucus now," she says, "as a miraculous, wonderful substance, a lifesaver and something to be terribly grateful for."

Without mucus, a slug would quickly be invaded by a host of microbial denizens and die. It would also be immobile, for slugs require mucus underfoot on which to crawl. Secreted from the pedal gland, located just beneath the head, the mucus flows down to the slug's single muscular foot. Like a miniature asphalt machine, the slug first lays its road and then, with wavelike motions of its foot, moves over it. As the mucous "road"

dries, it becomes a silvery map of a slug's travels.

When we want to convey the idea that someone is moving a little slowly, we say he's "sluggish." But while it's true that slugs are not the planet's speediest creatures, Deyrup-Olsen says humans usually observe them only during daylight hours, when slugs are least active. "Any extraterrestrial creature who was looking at *us*," she says, "and was looking at us only at night, would say, 'Boy, these are sluggish people!' "

Slugs have been clocked unofficially at speeds of up to .034 miles per hour over short distances. Their normal cruising speed, though, is quite a bit slower, about .0056 miles per hour. In most cases, slugs move this quickly only at night, after crawling out from beneath houses, rocks, boards or fallen leaves to begin their feeding forays. Slugs prefer the cooler temperatures and higher humidity of darkness because their bodies cannot regulate the amount of water that passes into or out of them. Prolonged exposure to sunlight would shrivel them quickly.

Going to the races at a slug festival

To see a slug moving at full speed during daylight hours, you have to attend a slug race. One of the oldest and best known takes place in Elma, Washington, a logging town about 25 miles from the Pacific coast with a population of around 3,000 people. The races are part of the Elma Slug Festival, which for the past ten years has celebrated one of the town's most abundant resources, only slightly less numerous than the giant firs nearby. Says Nina George, festival organizer: "You go out in the backyard around 4:30 in the morning on an overcast day, and it's just a glaze of slippery, slimy yuk! There might be 400 of 'em crawling around."

With this kind of abundance, racing slugs are easy to find around Elma. Yet some folks just aren't satisfied with an ordinary slug. So they turn to Elma's only acknowledged slug trainer, 14-year-old Steve Morrow, who for the past six years has raised a large stable of banana slugs for competition. He uses only championship breeding stock, feeds his slugs a wholesome vegetarian diet and works them out on an inclined board, its edges coated with salt to discourage meandering. On race days, Morrow can be found outside the Elma Variety Store, doing a brisk trade at $1 per racer.

Across the street, in front of Fisher's Doodle Inn, which during the festival serves such memorable drinks as Slugaritas and Slug Coolers, the crowd gathers around the slug track for the first heats of the day. The track consists of a large table with six straight, narrow lanes and an infield made of artificial turf. The distance is .003 furlongs (about two feet) and the track record, set in 1982, is 43 seconds, which works out to about .034 miles per hour.

Ariolimax dolichophallus can lower itself on a strand of mucus much like a spider does on a thread of silk.

Brand-new slugs explore a maple leaf; transparency of eggs identifies them as those of *Limax maximus*.

But after watching a few heats, I began to wonder if the record-setting slug, a critter named Poo Poo Too, hadn't been illegally doped up. The average winning times of the races I saw were closer to five minutes—a slow five minutes at that.

To a slug-racing aficionado, the only slug worth betting on is the native banana slug. Invariably the banana will defeat virtually any other species in contests of speed. This includes *Limax maximus*, a large European slug that "emigrated" to the United States (traveling on the roots of flowers or bulbs, probably) around the turn of the century.

The European slugs are the ones that prey on cultivated flowers, fruit and vegetables. Banana slugs prefer to graze on wild plants, fallen leaves or, in rare cases, dead animals. It's been shown that they make a significant contribution to the decomposition of leaves into soil material.

It was the European interloper who turned up in a recent national advertising campaign by AT&T Bell Laboratories. In a three-page magazine ad, a large, shiny *Limax* looks to be slithering toward a computer screen. The headline above it reads: "Slug as savant: Nature has shown us there are powerful computer designs very different from conventional machines."

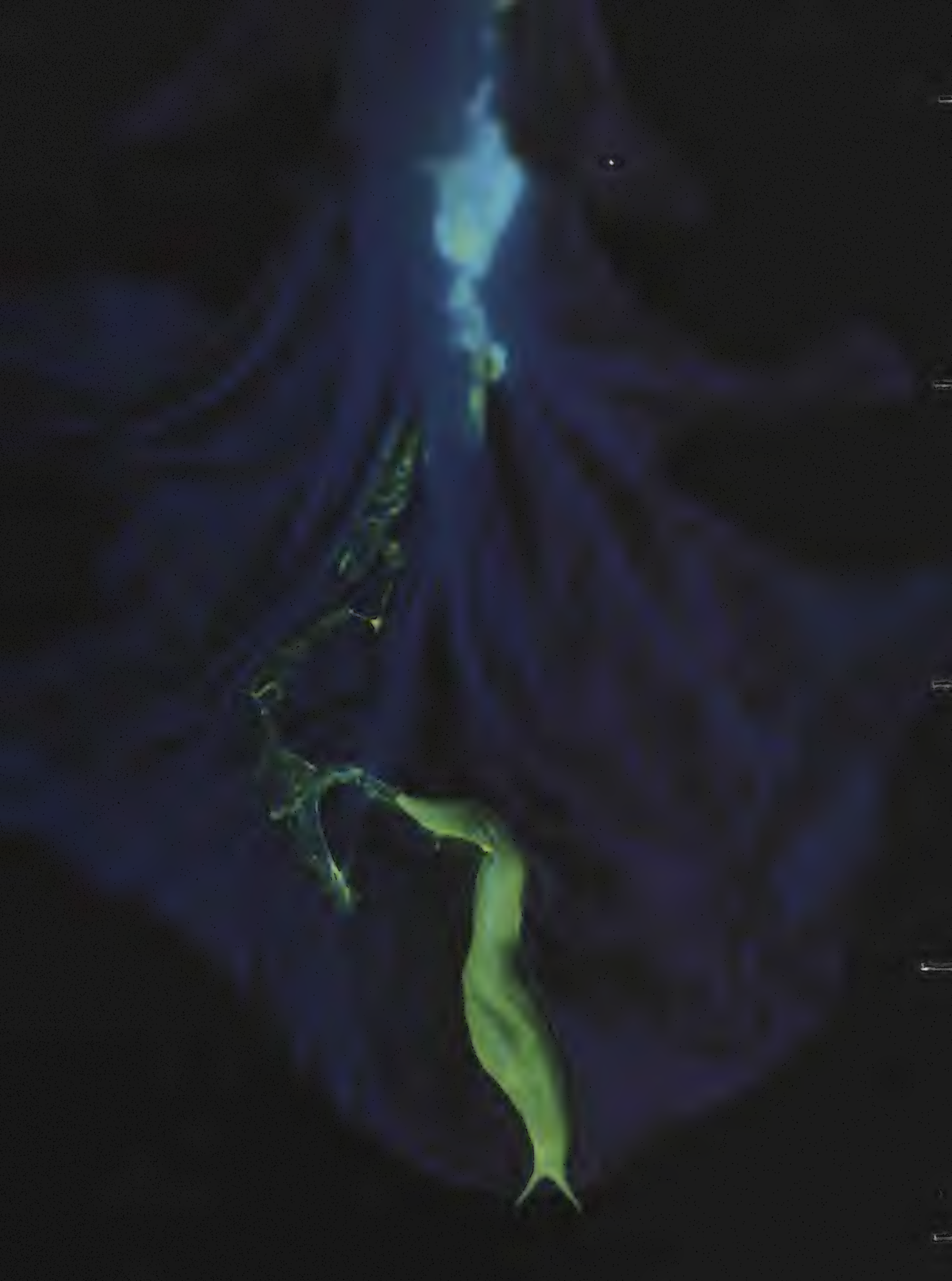
The ad goes on to say that scientists are studying the brains of slugs to gain insights into how to make computers that work as a brain does. "Though the slug is no Einstein," the ad says, "its brain's limited ability to learn—to associate new information with existing memories—makes today's most powerful computers seem primitive." Slugs are ideal for this research because their brains have a relatively small number of cells (around 500,000), and some cells are so large they're visible to the naked eye.

Bell Lab scientists aren't the only ones who appreciate the intelligence of slugs. Puget Sound Indians respected their wisdom, too. Vi Hilbert, the Upper Skagit elder who is also a storyteller and teacher, says that Slug appears in a number of ancient legends. In one such tale, from the Lummi tribe, an evil spirit has impaled a woman on the branch of a cedar tree, and drops of her blood form wild blackberries as they hit the ground. All the animals of the forest gather to try and rescue the woman. But each attempt fails. The last to try is Slug, who crawls up the tree with agonizing slowness. When he finally reaches the woman, Slug slowly and deliberately lifts her off the branch and inches back down the tree, delivering the woman to safety. This is a parable, Hilbert says, that shows the virtues of patience combined with slow and steady action.

Yet it may require an even greater amount of patience on the slugs' part before most people come to appreciate them as much as the scientists do. Deyrup-Olsen, who often champions the slugs' point of view in the local press, thinks educating children about them is a good place to begin. "They may say 'Yuk' when they first see them, but kids are very sensitive to things that small," she says. "And when they see the eye and know it's an eye, and see the little breathing hole, they get very fascinated."

Perhaps all the recent publicity about slugs will indeed begin to affect the way people—even people who tend gardens—view them. It certainly couldn't hurt. Ken Bakeman, for one, thinks his wooden pet slugs are helping to improve the image of live slugs everywhere. "You may think that's preposterous," he says, "but time after time people will say, 'I kill those things, I hate those things, but I like this little wooden one.' And that's going to affect their whole relationship with slugs."

After being injected with a harmless dye, a slug and its mucous trail fluoresce brightly in ultraviolet light.



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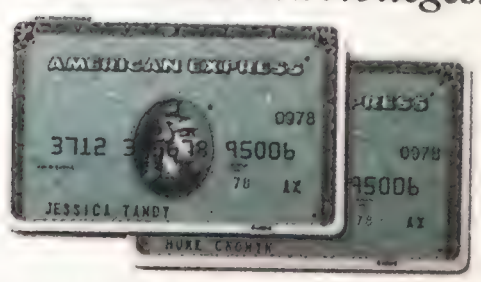

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By James R. Chiles

Flying cars were a dream that never got off the ground

In the postwar euphoria of the 1950s, cars with detachable wings seemed about to fill up the skies with flocks of commuters

Without its wings, Robert Fulton's Airphibian could cruise along the highway (safely) at 45 mph.

Perhaps in some alternative universe, on some alternative Earth, the dreamers were right. On a typical day there, the dawn sky is spotted with thousands of commuters flying from their woodsy homes and beach houses, heading for work in the city. Each Saturday, the flying families take to the air again for visits to far-scattered friends and relations. Hearing a suspicious rattle on the way from Wichita to Salt Lake City, one of these pilots has no reason to panic, because U.S. 36 has a roadside landing strip every ten miles. He lands, folds the wings and drives to a full-service gas station at Last Chance, Colorado, for a quick fix. Then, noticing thunderheads over the Rockies, he avoids all danger by sticking to the highway and driving underneath the storm.

On our Earth, however, the auto-airplane never took flight with the buying public. Though several prototypes were in daily use during the 1950s and one amazing model got within heartbreaking distance of full production, the problems of nationwide deployment proved insurmountable. Federal agencies curled up in horror at the thought of hundreds of thousands of amateur pilots meeting daily over major cities. The design of a good airplane, which puts a premium on light weight and high power, clashed with the ideal qualities of an automobile: sturdy, cheap and roomy.

The failure was not for lack of imagination. Since 1936, the U.S. Patent Office has seen filings for more than 30 designs. Some inventors even gave their paper designs the ability to float, no doubt figuring that any place a boat-car-plane couldn't go wasn't worth visiting. Many plans were the result of backyard tinkering and never made it into the air. Of those cars that did fly, at least three prototypes crashed; one model, a Pinto wearing wings from a Cessna Skymaster, killed its developers. Only two models were ever licensed for production.

The flying car, which now may seem only a wild fling in our romance with the automobile, peaked dur-

The pioneering vehicle, unveiled in 1946, could also fly up to 400 miles on 30 gallons of gas.

ing a postwar love for anything with wheels, especially four wheels. It was a time of garish prototypes shaped to grab front-page photographs: two Ford offerings of the mid-'50s were the bubble-topped Lincoln Futura and the torpedo-like Ford FX-Atmos, a car with fins big enough to shame a shark. General Motors replied with the titanium-bodied, gas-turbined Firebird II. But progress sidestepped them all and left them as prey for collectors and museums.

The usefulness of a car that flew seemed so obvious that it was dreamed of before there were even cars or aircraft—a gliding carriage was built in 1808. Many schemes followed, and the first car to really fly arrived not long after Orville Wright touched down on the sands of Kitty Hawk. In 1917 the Curtiss Autoplane, an aluminum-framed car with three wings, appeared at the Pan-American Aeronautical Exposition in New York City. It wasn't for the Model T crowd: a pilot-

In 1949 demo for *Life*, Fulton flew Airphibian from his suburban home for a night out in New York City.

After landing at airport, storing wings and driving into town, Fulton parked to catch a Broadway musical.

chauffeur sat in the front and two passengers basked in their own velvet-curtained and leather-lined compartment. It did fly, though not briskly. American inventor Glenn Curtiss dropped the idea with the nation's entry into the European war.

Curtiss had used a simple set of chains and gears to take power from the engine and drive a four-bladed propeller. The inventors that followed had no end of trouble, though, solving the problem of how to run their contraptions on the highway without making them too heavy to fly. A French design called the Aviocar mounted a small gasoline engine on the tail wheel to push it around the boulevards of Paris.

The simplest answer was to run the propeller on the highway—and several designers did just that. One prototype out of Georgia was a folding-wing modification of the popular Ercoupe, an easy-to-fly airplane of the '30s and '40s intended for the mass market of weekend pilots. Warned one magazine writer dryly about the model: "Propeller guard as now designed does not adequately screen the whirling blade to prevent a person from falling into the propeller from the front."

This gruesome possibility was preventable with better prop guards, but nothing could have prevented street-level propellers from sucking up hats, deafening pedestrians and reshuffling the racks of sidewalk newsstands. The prospect of these vehicles hitting the mass market, with whole streetfuls of such machines at rush hour, is hair-raising.

The first flyable cars with a chance for mass production rose out of a Roaring '20s plan for an airplane cheap and durable enough for nearly anyone: in the lingo of the time, a "flying flivver." It looked like a job for Henry Ford, and he backed experiments that brought forth a pocket airplane called the Sky Car. Ford lost heart after it killed one of his friends, though, and no other manufacturers shouldered the project.

The new Roosevelt Administration believed it worthy and in 1933 appointed a flying firebrand by the name of Eugene Vidal to get something going. Vidal, a former Olympic athlete and military pilot (and the father of author Gore Vidal), planned at the outset that his Bureau of Air Commerce, using Public Works Administration funds, would build the planes itself and sell them for $700 apiece. Government lawyers vetoed the idea, however, and instead Vidal sponsored a competition for a cheap "safety airplane." The contest attracted more dreamers than designers, and he held back the prize to name five groups that would produce prototypes for the government to study and test.

The results were remarkably ugly. Several are at the National Air and Space Museum's Garber Facility in Suitland, Maryland: the welded-steel structure of the Pitcairn AC-35 entry gives it the complexion of the Tin Woodman after a fistfight; the Hammond is covered with corrugated metal that makes it look like a flying toolshed. But by and large they were sturdy, good fliers and as foolproof as

Mr. Chiles doubts that flying cars, with a shortage of luggage space, could have succeeded without flying trailers.

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anything with wings can be. The Pitcairn was an autogiro, meaning it could use short runways: it had a nose propeller, like an airplane, but had top-mounted rotors, like a helicopter. It also had a powered tail wheel, so a company official delivered it to Vidal by landing in downtown Washington, D.C. and driving to the Department of Commerce.

Another clever entry, the Waterman Arrowplane, was later adapted for highway use as the Arrowbile with a simple transmission and detachable wings. Both models were more airplane than car, though, and accordingly fragile on the ground. An owner would have been foolish to drive them in daily traffic. Like the rest of Vidal's brainchildren, neither made it to mass production.

Vidal resigned in 1937 and took his dream with him. Then the war suspended all civilian flying plans, whether baked or half-baked, but compensated by promising a tremendous postwar boom in flying. Weren't the Army Air Forces and the Navy training fliers by the tens of thousands?

A 1951 magazine cover heralded a new age with an aircraft in every garage.

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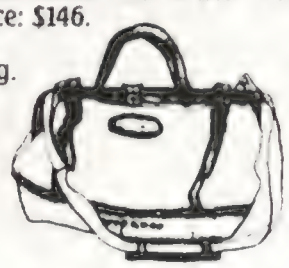

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Amphibious car of 1949 was one of several vehicles for motoring by sea.

Wouldn't these pilots come home with both feet off the ground and eager to spend war earnings on some kind of family airplane? Everyone with access to printer's ink seemed to think so. "Consider a landing strip as you consider a driveway in drafting your land plans," warned *House & Garden* early in 1945. Polls and predictions pointed to as many as 15 million private airplanes after the war. In early drafts of the 1944 Highway Construction Act, Congress was calling for roadside landing strips alongside all major highways. And right after the war, for a little while, it appeared possible. Americans bought some 30,000 private planes in 1946; Macy's and Wanamaker's department stores in New York hung small planes from their ceilings.

The time looked ripe for the flying car. Consolidated Vultee, a major warplane manufacturer, got under way with its Convaircar, a fiberglass auto that a driver could take to the

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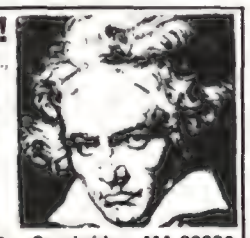

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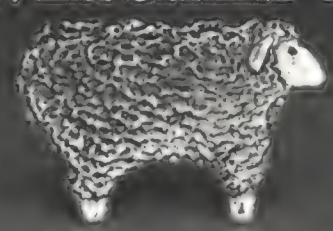

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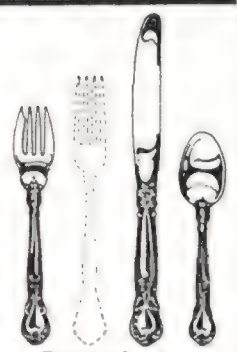

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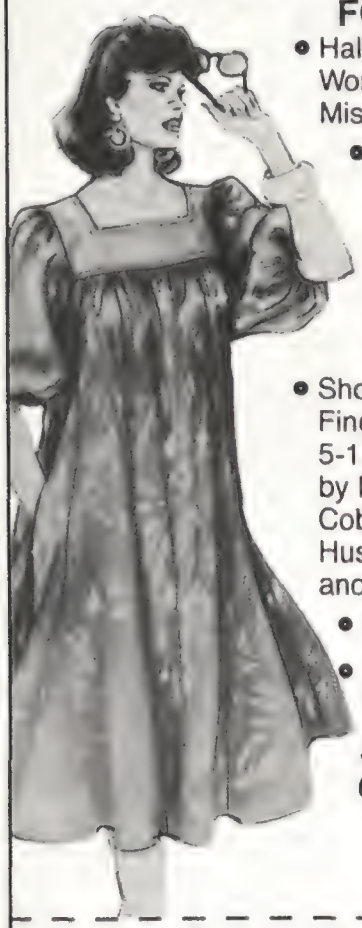

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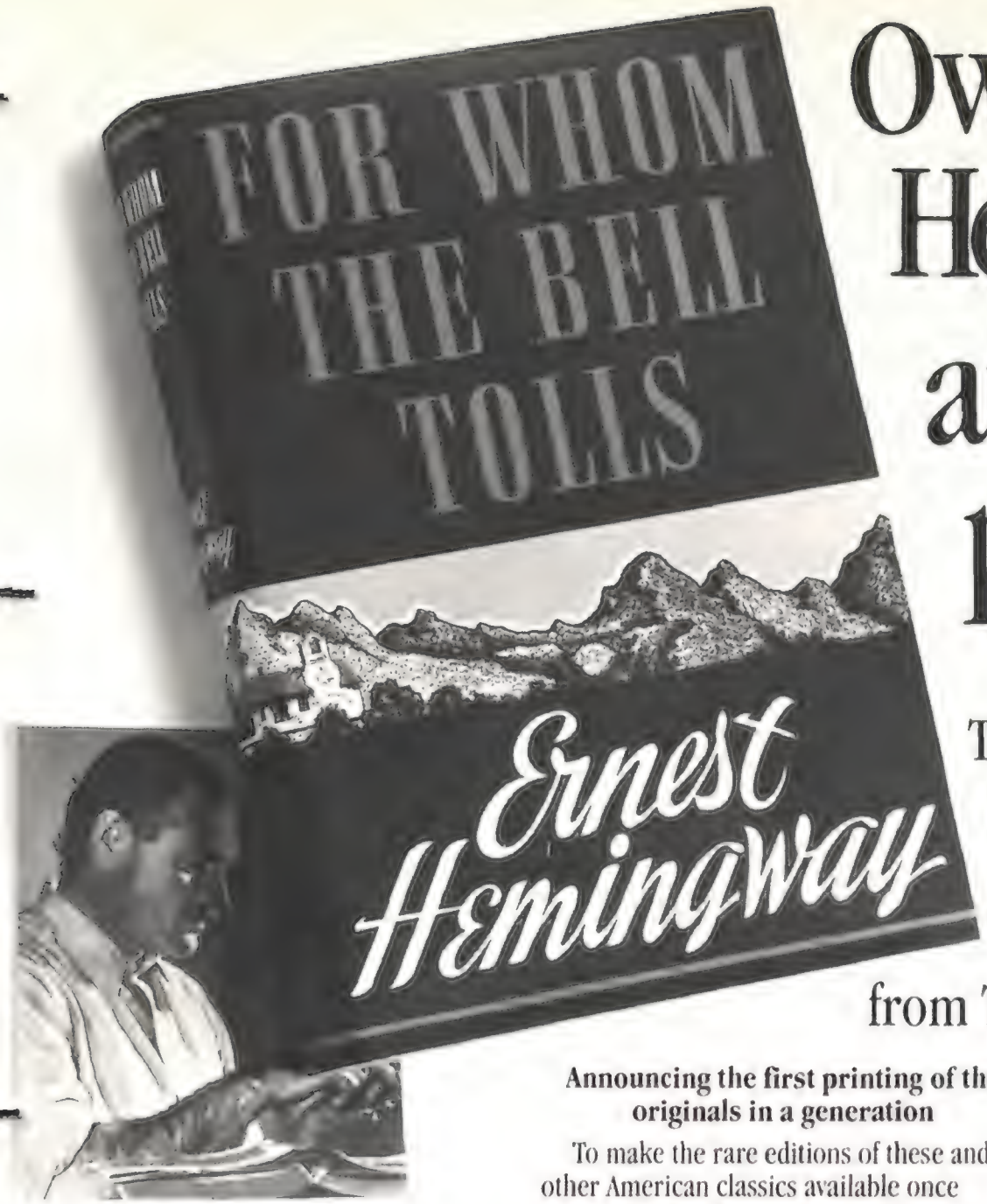
nearest airport whenever he felt the need to fly. There a Consolidated franchise would rent him a rig that would mount atop his auto to make an airplane. (The rental unit was essentially a 190-horsepower engine with wings, fuel tanks, steering wheel and tail; it sat on three spindly legs long enough to allow the car to back in underneath. The instrument panel and flight controls dropped down through a hatch in the roof.) After all the connections were complete, the part-time pilot would fold the storage legs and fly off. At his destination airport he would turn in the wings and drive on.

The Convaircar first flew in 1947 and performed tolerably (the designer, Theodore P. Hall, had participated in the design of the B-24 bomber and the Catalina flying boat), but on the ground it would have captured no race trophies. And it never got the chance. The prototype crashed during flight testing when it ran out of gas, reportedly because the pilot had his eyes on the auto's fuel gauge rather than the airplane's. The company folded the project in 1948, when it was apparent that the expected post-war flying explosion was a fizzle. (Private airplane sales in 1948 were down to a quarter of those in 1946 and still diving.)

Another designer of the '40s agreed that the flying car should leave its wings at the airport. He was Robert E. Fulton, a successful manufacturer of gunner-training devices during the war. Immediately after Japan's surrender, he took on the flying car problem. Fulton was untrained in aerodynamics, but versatile enough (architect, cinematographer and welder) to put his idea in the air.

His small company camouflaged its operations out of fear of alerting the big manufacturers. His buyers obtained aircraft parts through fronts, his first Airphibian went through runway tests only at night, and the road tests used remote country lanes. When the Airphibian went public in 1946, magazine and newspaper reporters leapfrogged one another in praising it. *Life* followed Fulton and wife on an evening flight from Connecticut to New York City for a performance of *Kiss Me, Kate.* Even at the height of the

Flighty designs were as much a part of the 1950s as earthbound automobiles like the streamlined Lincoln Futura of '55.



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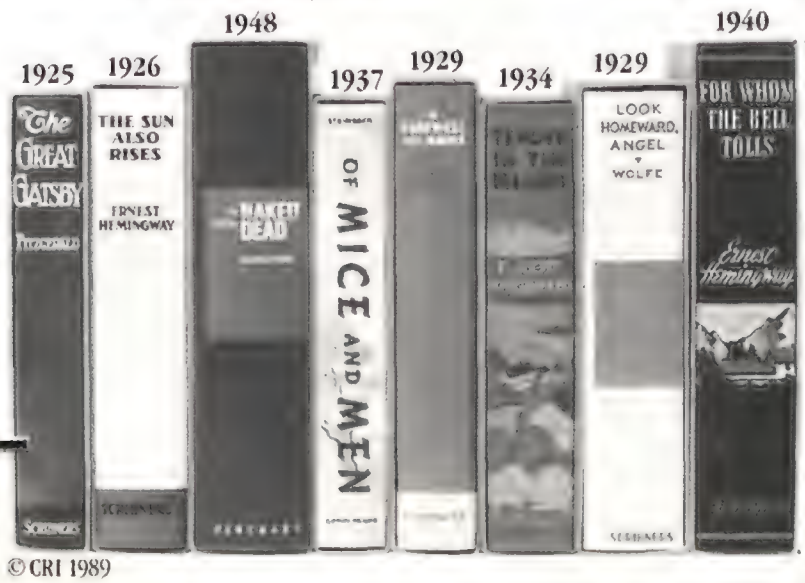

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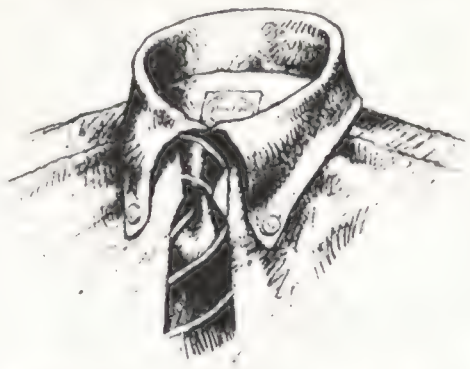

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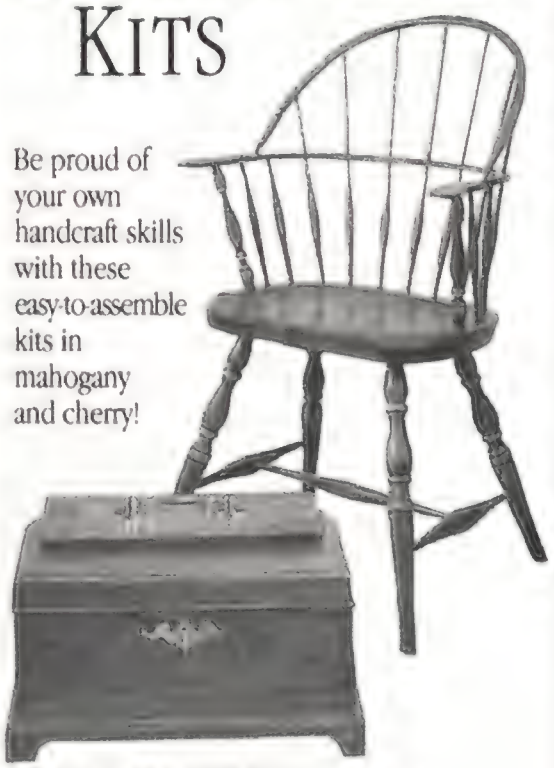

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The Arrowbile, out for a drive in Santa Monica, could reach 70 mph.

publicity, Fulton was so wary of competition that he refused to discuss the mechanical details.

The Airphibian had two sections: a wings-and-tail unit, which came off in one piece and stayed at the airport between flights, and a narrow two-seater convertible car with four airplane-size wheels sticking out on struts. For highway driving, the operator unbolted the propeller and left it behind with the wings and tail.

Fulton got approval from Federal Aviation Administration inspectors to manufacture the Airphibian, but never found the way to market. Eventually, he sold his beloved idea to Taylorcraft, a lightplane manufacturer, which shelved it permanently. Today, one of his prototypes is on dusty display at the Pate Museum of Transportation near Fort Worth, Texas.

Beneath the glowing reports lay a number of problems, many of which were shared by all flying cars. "In daily use you have a rugged little coupé capable of its share of the normal chores of life," read the Airphibian ad copy, but the vehicle was anything but rugged. It would have suffered expensively from city traffic; a minor collision with the rear end of a bus would have punched the propeller shaft right off the Franklin engine. Repairs would have required the costly services of a licensed airplane mechanic. It was underpowered as an airplane and overpowered as a car.

The flying auto that most neatly solved the wing-storage problem and came nearest to commercial success was Moulton Taylor's Aerocar. Taylor's homegrown company built seven by hand between 1946 and 1967. Throughout, the citizens of Longview, Washington, bought his stock and cheered him on.

His two-seater Aerocar had many jumps on the competition. A change-over from plane to car took less than five minutes and needed just one tool, a handcrank; the operation transformed wings, tail and propeller into a trailer towable by the car. (The trailer wheels popped out of compartments in the wings' leading edges.) That trailer completely liberated the owner from airport hangars. He could take his wings home, park them in the garage and use the fuselage as a front-wheel-drive sports car; or he could tow the wings for hundreds of miles until he felt like flying again.

The Aerocar had many ingenious features. The same 143-horsepower engine served both the tail-mounted propeller and the highway wheels. All airplanes need some kind of automatic noisemaker to warn the pilot of

Waldo Waterman's 1958 Aerobile is now in the Smithsonian's collection.

★ The 200th Anniversary of the United States Presidency ★

Two hundred years ago, the American people began a totally new and grand experiment in democracy. On April 30, 1789, George Washington recited the Oath of Office as first President of the newly-formed United States of America. On January 20, 1989, George Bush recited those same words and began his term as America's 41st President. The United States Historical Society invites you to celebrate this important anniversary with two issues that commemorate the Bicentenary.

The Presidential Bowl

The Presidential Bowl celebrates 200 years of Presidential leadership. The bowl is by Pickard, creators of fine china service for the U.S. State Department and American embassies around the world. Around the outside are portraits of each of the 41 U.S. Presidents. The President's name is below each portrait. A border of swags and bunting decorates the inside of the rim. The rim and foot are adorned in pure 24-karat gold. The seal of the Bicentenary of the Presidency is on the inside bottom of the bowl.

- By the House of Pickard
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- Actual size: 9½" diameter

The Presidential Stained Glass Plate

The Presidential Stained Glass Plate represents the essence of the American spirit of liberty and democracy. George Washington leans against a Roman column of 13 shafts, representing government and authority. At his feet are the bright flowers of today's Rose Garden, symbolizing his role as a gentleman planter. Behind him is the White House, which he never occupied, but which is now a symbol of the Office of the President.

Artists of The Stained Glass Guild apply 16 individual layers of transparent enamels to variegated cathedral glass to create each Presidential Plate, which is crafted in the manner of Medieval glaziers. After the colors are in place, Guild craftsmen fire the glass in a red-hot kiln, fusing the glass and paints permanently. The colors will never fade. When it has been inspected and pronounced flawless, skilled pewtersmiths fit the glass into a rim of genuine lead-free Jefferson Pewter, polished to a mirror finish.

- Edition limit: 10,000
- Actual size: 10" diameter

The Presidential Bowl features the U.S. Presidents from George Washington to George Bush.

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Theodore Hall's Convaircar would rent its wings at airport franchise, then back into position for the hookup.

Airborne with its flying rig, Convaircar was ultimate in comfort aloft. Its prospects ended with crash landing.

a stall; the Aerocar honked its horn. If the pilot goofed and forgot to lock the wings on firmly, safety interlocks disconnected the starter until he got it right. As an airplane, the Aerocar was remarkably stable in flight. The aviation official who approved the design for sale in 1956 has called Taylor an inventive genius of the first order.

If true, then the project's co-genius was an aircraft mechanic by the name of Jesse Minnick. Both Minnick and Taylor are still around; I met them in the building that holds what is left of Aerocar Inc.

It's a faded, two-story, blue metal box on the south side of Longview, well within nose-wrinkling radius of huge pulp mills on the Columbia River. The building is part workshop, part office and part museum. It holds so many aircraft pieces and airplane artifacts, and its occupants have so much evident love of flying, that it seems the whole building might take wing in a stiff breeze. Tables are heaped with old flying magazines, plans, models, awards and specifications. Souvenirs of the Aerocar era are visible throughout, although Taylor dropped the project for a 20-year period. He's been designing small experimental aircraft for home assembly by hobbyists, and this is the main business of the workshop in the rear.

I found Taylor at the desk in his roomy office, wearing a brown sweater over comfortable khaki clothes. He speaks in bursts of persuasion, using phrases polished by decades of proselytizing, to describe the wonders of the Aerocar and what might have been.

Taylor, born in 1912, remembers watching barnstorming pilots land in mint fields west of Longview and then hitchhike to town. Perhaps it was their extended thumbs that started the youngster thinking about the fact that an airplane was good only from airfield to airfield. For whatever reason, Taylor devoted his working life to putting wings and engines into the air. Spotted around his office now, among Aerocar memorabilia, are scale models of pilotless airplanes and guided missiles. This was Taylor's specialty during World War II, as a Naval Reserve officer directing development of pilotless aircraft.

During a wartime visit home, he met Jesse Minnick, a seasoned airplane mechanic, at a local seaplane base. Minnick had earned his boyhood flying credentials in Kansas by bolting wings to a motorcycle and crashing on takeoff; he started working on real airplanes in 1920. They agreed that the postwar public would jump for a flying car. Taylor was to provide business and design know-how, and Minnick would build it.

After the war the pair spent three years designing the first prototype, on capital raised by tapping 50 local businessmen for $1,000 each. In 1948 Taylor had a quarter-scale model, which he took up to the University of Washington in Seattle for testing in a wind tunnel. It was satisfactory; the next step was to build a prototype at a tiny factory on the south side of Longview. They borrowed some of the running gear from a Crosley auto and machined the rest. "We had to build the front-wheel drive from scratch, starting with steel pipe," recalled Minnick. "We couldn't use a Jeep's front drive. Too heavy." Minnick was the man who took Taylor's general ideas and made them work. (Minnick is still the kind of man who can squeeze the last bit of usefulness out of any device. He showed me a putty knife he bought around 1920 and carries to this day; decades of metal scraping have shortened the blade to a stub.)

Aerocar first flew in 1950, but not very far because the propeller fell off. The explanation was not a loose nut, but a major mechanical difficulty posed by Taylor's determination to mount the propeller on the tail and connect it to the engine with a long shaft through the tail boom. Each time a cylinder fired, the engine wound up the long drive shaft like a spring because the propeller on the other end was lagging slightly behind; then the propeller would catch up and untwist the shaft, the brutal "snap-

At first she thought it was the Golden Alaska Caviar, or the chilled vodka. But when his face took on that ear to ear grin, the one she hadn't seen for a while, she knew it was more.

"Let's get married," he said.

"We're already married," she said.

"Again," he said.

And over Pink Lobster Bisque and Peppered Canneloni they laughed and planned a shipboard wedding.

And when the last morsel of Royal Pheasant was gone, when the Gateau Napoleon had been reduced to crumbs, it was written in stone.

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Taylor's wife got into prototype of Aerocar I after hotel stopover in '50s. Folded wings and tail were towed in trailer.

torque" quickly breaking it. The Wright brothers, Taylor knew, had faced a similar problem on their *Flyer* because they drove their propeller with chains, which often snapped. They solved the problem with a 40-pound flywheel, but Taylor wanted a solution without dead weight.

He consulted aircraft designers and they told him to give up. Anybody else might have done so, but Taylor is the sort of man who could give snapping turtles a lesson in persistence. A tail-mounted prop was important to him because it was ideal for a flying car that shed its tail for highway operation. It also kept the wings free of the swirling airflow caused by a nose-mounted propeller. And it saved the pilot from having to unbolt the prop from the nose every time he wanted to drive anywhere.

After several years of frustrating experiments with everything from gears to rubber, Taylor and Minnick finally found the answer in a European invention that used a few pounds of tiny steel balls as a sort of dry fluid drive. It quelled the vibrations, and Taylor had finally achieved his breakthrough. His company won all its permits by 1956 and built five vehicles for sale, dubbed Aerocar I. Taylor and Minnick set out on the motel-and-hamburger circuit to pump up interest in the $25,000 machines. They flew in air shows and attended car meets from sea to sea. They flew to Cuba and took Fidel Castro's brother up for a ride. They lugged an Aerocar onto the set of the TV quiz show *I've Got a Secret.*

"I never got tired of all the attention," Taylor said, explaining that driving one through a city typically caused so much gawking that police were needed to direct traffic.

Aerocar peaked in 1961. That year, actor Robert Cummings was using one in his television comedy; Portland radio station KISN featured another for traffic reports; and Taylor was deep in negotiations with a Texas manufacturer for mass production at $14,000 apiece. Dealers started lining up for franchises.

The next year, though, Aerocar hit a wall. CBS canceled Cummings' show

and he sold his model back to Taylor; the radio station shifted to a different airplane for traffic watching; and the Texas plans collapsed in hard feelings. But Taylor kept trying and began work on an improved model.

Just how well did Aerocar I perform? One historian dismisses all flying cars as akin to putting roller skates on crutches, but some who flew in the Aerocar are more nostalgic. Allyn Merris flew one regularly as a traffic reporter for KISN; I found him at an insurance office in Vancouver, Washington. "It was underpowered," he said after a thoughtful pause. "It had unique flight characteristics, some of which were good, some fluky and some not too swell at all." His model was difficult to start: "It was a matter of gritting your teeth and holding your tongue just right," he said. And in hot weather it climbed only with difficulty. One day, when its pilot and the passenger it carried were both heavy, it refused to lift off the runway.

"It was a marvelous piece of machinery, though," he said. "The turn signals for the automobile part were like the turn signals on London taxi-

Moulton Taylor's Aerocar is still being flown by owner Gary Norton.

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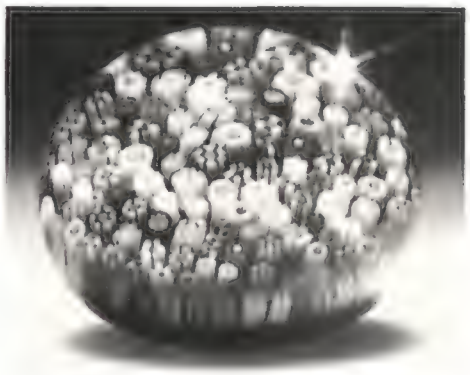

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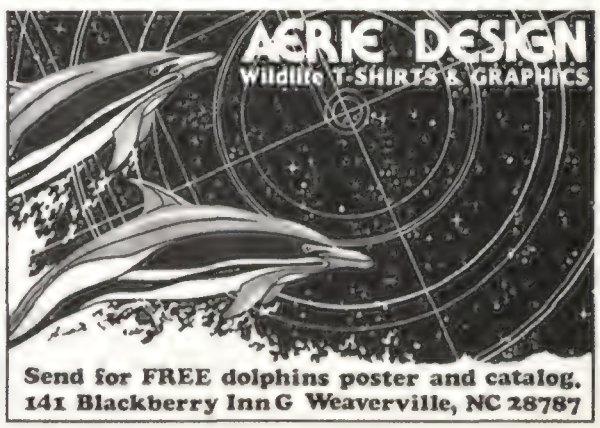

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Bob Cummings flew, landed and drove an Aerocar in 1961 TV comedy series.

cabs—instead of flasher lights, these little flippers would pivot up and out of the side. That seemed unusually complex and un-aerodynamic, but pilots always used the turn signals in midair because it was so much fun. And we'd honk the horn at the seagulls.

"It was a maintenance hog and not a great airplane, but I never felt unsafe in it," Merris summed up.

Equally impressed with the gadgetry is Gary Norton, owner of a flight museum near Boise, Idaho. He keeps his Aerocar in flying condition. "When you're making the changeover from plane to auto, it seems like whenever you're looking for a support or a wheel or an attachment, it pops out of a little door right when you need it," he said.

Taylor made many improvements in his second version, the Aerocar III (he had assigned numeral II to a plane). It was quieter and much more streamlined. Aerocar I had a dowdy appearance—looking like a lemon with wheels and wings—but the red-bodied Aerocar III was remarkably sleek and sporty. Taylor built just one and made his last reach for the mass market.

In 1970 top executives of the Ford Motor Company considered adapting Aerocar III for the public. Internal

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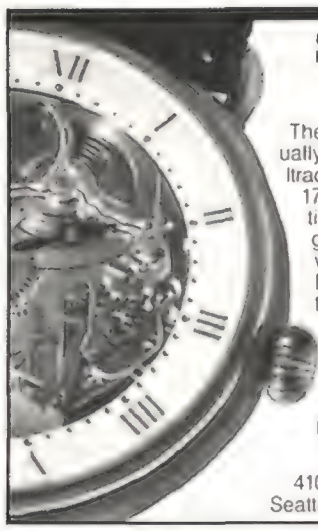

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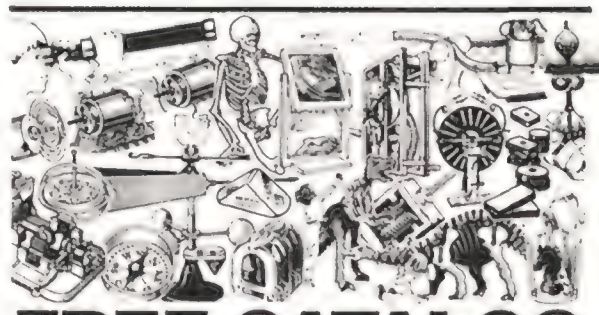

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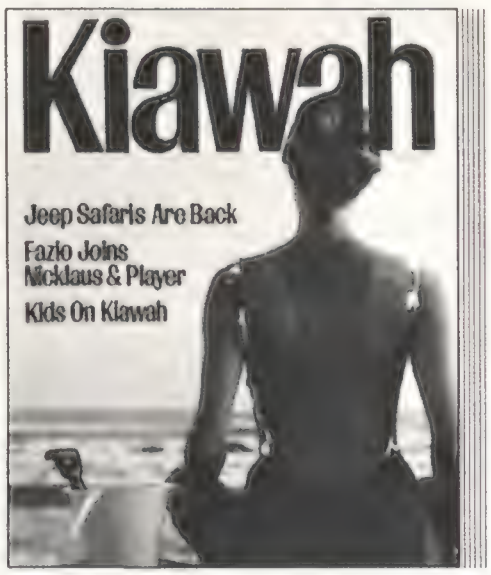

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reports were optimistic, forecasting sales of 25,000 yearly, and the Ford men took Taylor to visit with the U.S. Department of Transportation. To hear Taylor tell it, agency officials were aghast at the prospect of amateur pilots by the thousands routinely flying through metropolitan areas.

Ford soon lost interest and Taylor's other financing disappeared. Now, almost 20 years later, he's working on yet another design: Aerocar IV. This time he would mate a Honda two-door subcompact car with lightweight flight components based on the old Aerocar approach. He would use a separate turbine engine for the propeller and mount it in the tail. The buyers would also be the builders, under federal rules that allow hobbyists to construct "homebuilt" experimental aircraft. This would eliminate manufacturer's liability difficulties that he says would make the plan impossible otherwise. And because the Honda is already approved for highway use, it would avoid some of the manufacturing paperwork required. (Even so, the owner would have to carry a big wallet: Aerocar III took eight state and federal licenses to operate.) It's hard to tell how serious the pair is about the idea of starting over again on another flying car. "I'm doing this to stay out of a rocking chair," said Minnick. "Or, in my case, a wheelchair," added Taylor.

I asked Taylor if all the decades of frustration were worth it. He didn't even need to stop and think. "If I'd known back then what was ahead, I'd never have done it," he said, but then he laughed as if to take it back. Ironically, while the Aerocar never made Taylor a dime, the Longview land he bought for his Aerocar factory brought so much on resale that it fixed him for life. He can also be grateful that he came away with his life after all the flight testing he did in 20 years of Aerocar work.

And Taylor can be proud that he went further than anyone else in taking the automobile—arguably the most useful machine of the century—and pushing its usefulness to the absolute limit. He went so far, unfortunately, that he left the buyers behind.

Moulton Taylor holds minimodel of Aerocar IV, designed for home assembly using the body of a Honda CRX.

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Book reviews

William Walton: Behind the Façade
Susana Walton
Oxford University Press, $22.95

Music lovers seeking thematic analysis or a historical overview of English music in the 20th century will have to seek those pleasures elsewhere, but listeners who love the power and the humanity in the music of William Walton will cherish *William Walton: Behind the Façade*, Susana Walton's charming memoir of her late husband. And so will any readers interested in the antics of some of this century's greatest artists and eccentrics. The Waltons were in the thick of it, their circle of friends was wide and colorful, William was generally a jolly and playful fellow, and Susana is nothing less than a charmer.

She was a charmer at the age of 22 also, when she first met William, 24 years her senior, in 1948. The daughter of a proper and wealthy Argentine family in Buenos Aires, she won William's heart—not a terribly difficult task, as she readily and forgivingly admits—from the first moment they saw each other. Within hours William asked her to marry him, within weeks they were engaged and William was providing the innocent Susana with a little book of anatomical drawings to ready her for the future. Her family opposed her marriage to an older foreigner with no visible means of support; his friends were shocked at the idea of William's marrying a "native." But the marriage, like William's fortunes, prospered, and they shared their lives happily until his death in 1983.

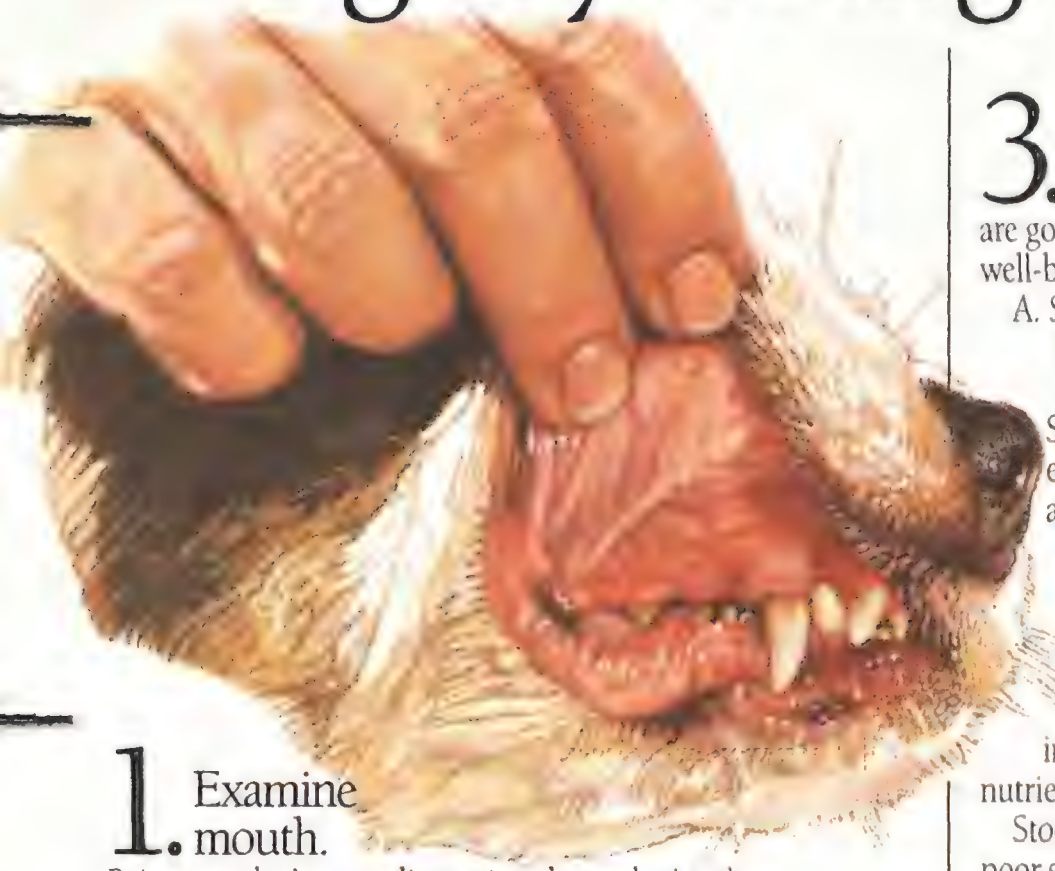
Neither a musician nor a musicologist, Susana writes about his music in a very realistic and level-headed way, echoing William's own views on composing. On the cello concerto William wrote for Gregor Piatigorsky, for example, she says "William thought of the cello as a melancholy instrument, full of soul; accordingly he wrote a rather sad tune for the opening, a sort of variation of it for the second movement. To get out of having to write a cadenza, which he always said was a nightmare, he finished with a melody with variations. Some people," she adds, "believe they can hear the Italian seashore in the opening of the concerto, rather like waves lapping against the pebbles. William found this very irritating nonsense."

Although William was 46 when they met and married, Susana provides a wonderfully anecdotal account of his life up to that time, including the 15 years during which he depended almost entirely on the Sitwells for his survival, and a period afterward of severe Sitwellian scorn when he achieved independence. She also recounts a great deal of private information, such as William's opinion that his work on the soundtrack music for Sir Laurence Olivier's *Henry V* was "more of a bloody nuisance than it is possible to believe."

Stories from the later years, when Susana was herself on the scene, are even more vivid and revealing, especially of the circumstances and characters among whom they lived. She tells of William concealing miniature whiskey bottles beneath his velvet Oxford hat to sustain him through Queen Elizabeth II's coronation ceremonies. And when William wrote some ballet music for friend Frederick Ashton, he observed that "there is more money in this sort of music than in writing a symphony." There are a few unpleasant tales, too—Stravinsky, for example, demanding to know what William was paid for a film score, and some very nasty stories about Arthur Koestler—but, overall, this is a warm and amusing book about a great composer by the one person who knew him best and loved him most. Gracefully written, it has a delightful story on every page. In addition, it reminds us yet again that great art is most often made by hardworking professionals, real people in a real world, and that the greatest art often comes from those professionals who can laugh at both the world and themselves.

Alan Ryan
New York journalist and novelist

If you've been buying supermarket pet food, give your dog this spot quiz.



1. Examine mouth.

Raise your dog's upper lip to view the teeth. Are they:

A. Clean, white and glistening. 20 pts.

B. Yellowed with signs of residue. 5 pts.

C. Decaying with evidence of tartar. 0 pts.

Like humans, diet plays a major role in canine oral hygiene. If you didn't check A, chances are you feed your dog a steady diet of wet foods, which can result in dental problems. Dry foods, however, help cleanse a dog's teeth and gums.

2. Feel skin and coat.

Thoroughly comb your fingers through your dog's hair in the opposite direction it lies naturally. Is it:

A. Healthy, vibrant and free of any flaky deposits. 30 pts.

B. Dry, lackluster and poorly elastic. 5 pts.

C. Excessively oily, smelly with uneven growth. 0 pts.

There are normal variations in different breeds of dogs at different times of the year. However, poor nutrition always adversely affects skin and hair. Dogs that exhibit healthy skin and hair eat a diet with the proper balance of fats and protein, vitamins and minerals.

3. Examine stool.

Stool size and consistency are good indicators of a dog's overall well-being. Is it:

A. Small and firm. 30 pts.

B. Large and hard. 5 pts.

C. Large and very soft. 0 pts.

Stool volume is largely influenced by undigestible foods and enzyme deficiencies.

Small, firm stools are easier to clean up, and also demonstrate your dog has properly assimilated crucial nutrients. Stool consistency indicates the quality of nutrients.

Stool from a poor source may be soft. A hard stool can represent a mineral or fiber imbalance.

4. Inspect nose and footpad leather.

Feel the tip of your dog's nose. Is the skin:

A. Tough yet pliable, with a slightly moist appearance. 20 pts.

B. Stiff, crusty or dry. 5 pts.

C. Very hard or cracking. 0 pts.

The nose leather of a healthy animal is clean, smooth and resilient. Similarly, footpad leather should be smooth and tough, yet pliable.

Nose or footpad leather that is dry or cracked may suggest a diet lacking essential nutrients and fatty acids.

If your dog scored 85 or less, don't just change dog food, change where you buy it.

All dogs have dietary requirements that demand quality sources of protein. Meat protein best satisfies those requirements.

However, many leading supermarket dog foods rely on grains for their main source of protein. Iams relies on meat, poultry and egg protein.

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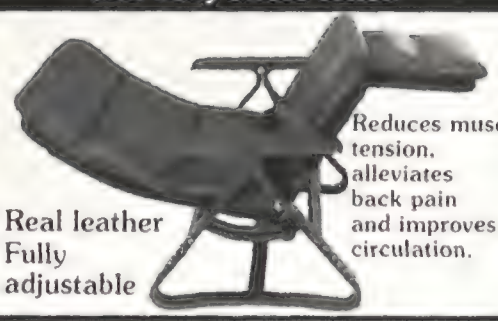
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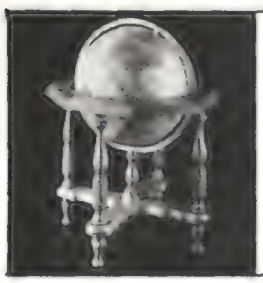
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The Frontiers of Paradise: A Study of Monks and Monasteries
Peter Levi
Weidenfeld & Nicolson, $16.95

Look out over the rooftops and towers of Florence from the hilltop church of San Miniato, and you're witnessing a scene Dante saw and wrote about. But as I stood transfixed there last spring, a figure abruptly came into my line of sight. An old Benedictine it was, tranquil and solitary, heading for the San Miniato cloister. Surely Dante would have noted him, for monks are part and parcel of human history.

From Old Testament prophets, to Buddhists in their saffron robes, to Indian ascetics, to early Christian hermits—men of deep faith feel in touch with something that most of the rest of us can only guess at, can only approximate at a distance, like scientists trying to measure heat at the center of a distant star.

It's paradoxical, what monks do. They withdraw from the world to encounter its essence. They're contemplative and yet active, as black and white as the flowing robes of the rugged, implacable Dominicans. At times in their history, monks have set good or bad examples for the world, have threatened mankind or elevated it, have promised unspeakable peace or grim despair.

That paradox, the mixture of sweet and bitter, is the key here. And as if to prove the worth of my hilltop observation, suddenly a raucous schoolboy broke the spell, sarcastically shouting out, "Ciao, Benedetto!" Head modestly bowed, the monk went on his way, heedless as a creature in the depths.

It's hard to think of a better person than a poet to write this compact and allusive book on monks and monasteries. Not just any poet, but an Oxford University professor of poetry. And not just any professor either, but one who was a Jesuit for 28 years. Jesuits, of course, are hardly monks. But that hasn't stopped Peter Levi from producing this enchanting book.

Years ago, Levi wrote a long lyric about monastic life that started where Shakespeare had left off, with those evocative "Bare ruin'd choirs where late the sweet birds sang." Responded Levi: "Monastic limestone skeleton,/threadbare with simple love of life/speak out your dead language of stone,/the wind's hammer, the sun's knife,/the sweet apple of solitude. . . ."

It's a life's work trying to under-

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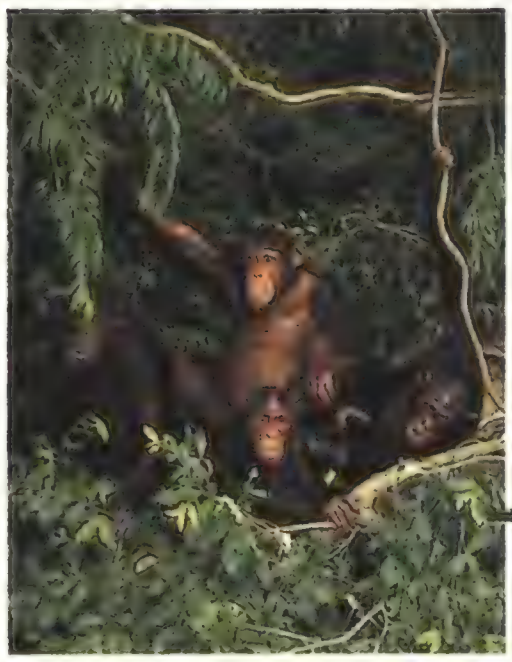

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stand the complexities of monastic history. So perhaps the high road is best—through the ineffable, through mysticism, through poetry.

Still, monastic history is "important" history. For Benedict, the Italian founder of the monkish way of life in the sixth century A.D., is also, in a very real sense, the begetter of European civilization. If that seems a bold assertion, look at what the monks gave us during their long and distinguished run. They saved classical civilization by copying and preserving Greek and Roman texts; their intellectual connections with Jewish and Islamic scholars brought innovation in architecture, music, art and poetry; in philosophy and theology, they buffed their arguments into a crystalline brilliance that marked the way for the natural science of the Renaissance and beyond. Truly, the monk's cowl was the refuge the world took shelter in during the long night after the fall of Rome.

Even in practical matters of daily life, monastic contributions still benefit us. Monks managed huge agricultural estates whose surplus prompted international trade. English monastic wool was a key element in the wealth of Renaissance Florence.

More than that, the monks' abiding interest in words and books caused them to develop the finest network of schools the world has seen. Charlemagne brought the monk Alcuin from the north of England to be chairman of his empire's board of education. On grounds of calligraphy alone, the world's investment in monasteries would have been a plus. Even modern drama came out of the religious drama performed as part of monastic rituals.

Saint Benedict's *Rule*, a guidebook for monks—possibly the most influential book in Europe after the Bible—had not so much to do with holiness as with a simple, orderly life. Benedict was totally against discontent among his monks, and devised ways of avoiding it. The real virtues were humility, stability, obedience, quiet. Contemplative monks are nice people, Levi says, who can "keep some crucial area of their minds gazing at God while they carry on business." Levi likes that sort of thing, and so the Benedictines are his heroes.

Levi tells us about the Good (the art, the music, the peace), the Bad (the Inquisition) and the Ugly (modern church architecture). He knows his Holy Orders. Franciscans were always closer to the people, Levi rightly points out; the Dominicans closer to the power brokers, the bishops. As a result, they—one might call them the hounds of God (Latin, *canes domini*)—were often troublesome.

Even so, Levi is refreshing on the two most influential Dominicans: Thomas Aquinas and Albert the Great. Aquinas is a monumental figure in the history of philosophy, but Albert merely reinvented natural science in the West for the medieval period. Says Levi: "It is rather unfair to him that, because science has progressed whereas theology has stayed in the same place or merely disintegrated, Albert's works are now of less interest to us than those of Thomas."

Levi saves his annealing fire for the topic of mysticism, a notion that probably brought on the rage for monasticism in the first place. Teresa of Avila (the great Carmelite mystic and reformer) and Saint John of the Cross (whose par-

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Monks' devotion to books, calligraphy, saved classical texts for future study.

ents probably were Spanish Jews, not surprisingly converted during the holy terror) gave us a brand of mystical poetry that changed the face of religious and secular literature from the 17th century onward.

In essence, Levi's argument has to do with margins: monasticism grew up on the edges, the margins, of the Roman empire, whether in the deserts of the East, on the fringes of Egypt's cities, or in the frigid beehive cells of Ireland. Later, when the barbarians were about to extinguish civilization, northern monks were called in to rekindle the whole. Inexorably, monasticism moved front and center. But so too had Christianity itself, which shifted from the margin to the core, at Rome.

Once established there, the faith had lost its edge. The dire test of martyrdom was gone. In its stead had come a new challenge, called monasticism. Moreover, this was a test imposed by that most demanding of masters—the self. It's a test that transcends particular doctrines and faiths. Deep down, I believe, the monks and their abbots and priors knew that.

Michael Olmert
Writer, *Smithsonian World*

Searching for Bobby Fischer: The World of Chess, Observed by the Father of a Child Prodigy
Fred Waitzkin
Random House, $17.95

When Bobby Fischer defeated Boris Spassky for the world chess championship in Iceland in 1972, the "royal game" became a royal obsession for millions of Americans. Chess sets and books sold out in stores, mothers enrolled their Little Leaguers in chess clubs, and grand masters briefly became the quarry of faddists and ratings-conscious chess groupies.

No one but Fischer, suggests Fred Waitzkin in his lively examination of today's chess scene, could have sparked such feverish interest in this "cerebral, slow-moving board game." "During the Fischer period," one chess buff tells the author, "it wasn't chess that turned people on. It was Fischer. He was a lunatic, and at the same time such a great player that he could beat the Russians single-handedly."

Fischer refused to defend his title against challenger Anatoly Karpov in 1975, and since then he has retreated into a life of squalid seclusion in California. The giant killer of Reykjavik has become the ghost of Pasadena.

Searching for Bobby Fischer is an enlightening, often disturbing journey through the "chess wasteland" that Fischer left behind—a half-world populated by Russian émigrés, talented winos, child prodigies, school dropouts, grand masters turned taxi drivers, and dollar-a-game hustlers in city parks.

Waitzkin's immersion in this subculture deepened abruptly in 1983, when his 6-year-old son, Joshua, began to display a genius for the game. In 1986 Josh won the National Primary Championship in Charlotte, North Carolina, and two years later he was the country's highest-rated 11-year-old player.

During the first tournament appearances by his son, Waitzkin struggled to reconcile his ambition for Josh's chess career with his urge to protect the boy from the pressures of competitive play. In the end, parental aspirations won out. "I've held a crying Morgan on my knee," writes Waitzkin of a friend's child competing in the same scholastic match as Josh, "kissed his salty face and at the same time felt relieved that he lost," that so far, at least, he had not earned more points than Joshua.

Having accepted his role of chess father, Waitzkin played it to the hilt. From 1983 to 1986 he escorted Josh to all corners of the chess world, from Greenwich Village to the Soviet Union.

For sheer chess mystique though, not even the Soviet capital can match the skid-row area of downtown Los Angeles, whose streets Bobby Fischer has prowled in various disguises for the past decade and a half. In 1986 Waitzkin made a pilgrimage there that has been undertaken by countless other Fischer-seekers. But he never found his man. From the few people still in contact with Fischer, however, he learned that, in one way at least, the former champion's life has not changed at all. "He still studies [chess] many hours a day," notes Waitzkin, "so what does it matter if his window looks onto an alley and there are roaches crawling in the sink?"

Anyone with Fischer's resourcefulness for living invisibly makes a slippery subject for book-length treatment. Realizing this, Waitzkin has assigned Fischer a supporting role in the larger drama of a father-son relationship with all the intriguing dynamics of a well-played game of chess.

Allan Fallow
Text editor, Time-Life Books

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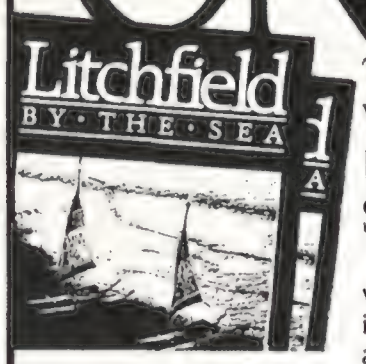

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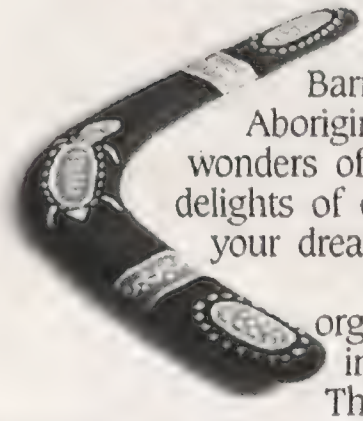

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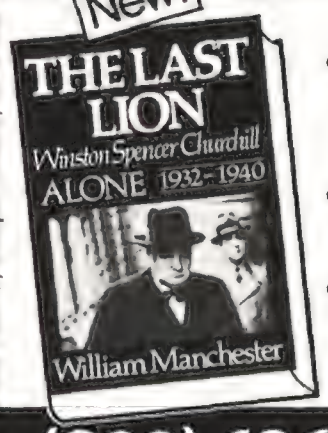

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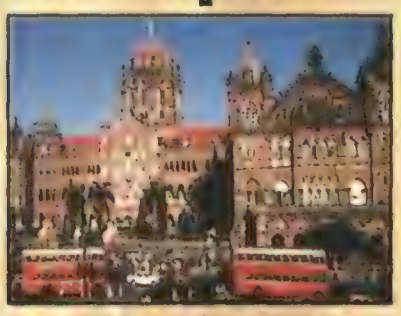

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Smithsonian highlights

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The Associates' Planning Packet is yours for the asking; call or send a postcard to Associates' Reception Center, Smithsonian, Washington, D.C. 20560; (202) 357-2700 or TDD for hearing impaired (202) 357-1729. Begin your visit at the Associates' Reception Desk, now located in the Arts and Industries Building.

Musical Weekend

Highlights of the 17th Musical Weekend, April 28-30, will include the Smithsonian Chamber Orchestra performing Beethoven on authentic period instruments; dinners at the National Portrait Gallery and the Museum of Natural History; luncheon at George Washington's farm; tea and music at the Chinese Embassy; and a champagne breakfast at the Air and Space Museum. To obtain additional information, write: Musical Weekend, Room 4124 NMAH, Smithsonian Institution, Washington, D.C. 20560.

Contributing Membership Program

The Contributing Membership supports the Institution's work in education, research and scholarship. Partially tax-deductible contribution categories are: Supporting, $60 (available only to non-D.C. area residents); Donor, $125; Sponsoring, $300; Sustaining, $600; Patron, $1,200; James Smithson Society, $2,000. Members enjoy special privileges including concerts and lectures nationwide and foreign study programs. For more information write to the Contributing Membership Program, 1100 Jefferson Drive, S.W., Smithsonian

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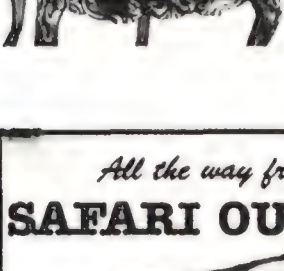
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Special February exhibits and events

National Museum of Natural History
Flowers from the Royal Gardens of Kew: Two Centuries of Curtis Botanical Magazine (through April 30) See *Highlights continued*, page 176.
Flora of South Africa (February 5-April 30) Botanical plates by watercolorist Elise Bodley, in the Naturalist Center.
Crossroads of Continents: Cultures of Siberia and Alaska (through April 2) First jointly curated Soviet-North American exhibit ever: traditional cultures seen through 500 artifacts.
"Coyote": A Myth in the Making (through March 21) Ten-year retrospective look at the works of American Indian artist Henry Fonseca.
Changing Views: Filming the Peoples of the North Pacific Rim (February 4, 11 A.M.-4 P.M.; February 5, 11 A.M.-5 P.M.) Two-day festival of films and videos by Soviets and North Americans, spanning 70 years.

Anacostia Museum
Inspiration: 1961-1989 (through March 5) Sixty-two works by 34 members of the District of Columbia Art Association.

National Museum of African Art
Royal Benin Art Creations from court artisans, 15th through 19th centuries.
Permanent Collection More than 100 masterworks from sub-Saharan Africa.

National Museum of American Art
The Art of Paul Manship (February 17-July 4) Sculptures, medals and works on paper by an American master.
Perpetual Motif: The Art of Man Ray (through February 20) Major retrospective on a founder of Modernism.

Arthur M. Sackler Gallery
A Jeweler's Eye: Islamic Arts of the Book from the Vever Collection (through April 23) Some 150 paintings and manuscripts from the Parisian jeweler's magnificent trove.
Japanese Art: Recent Acquisitions (through September) A ceremonial palanquin and screens.
An Introduction to Persian Painting (February 9; 6:30 P.M.) Basil Robinson, Keeper Emeritus, Victoria and Albert Museum, on Persian history and art.
Persian Tales (February 11 and 18; 9:30 A.M. and 5:30 P.M.) Children's storytell-

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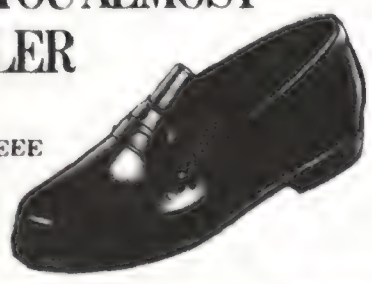

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ing sessions. Reservations required; admission free. Call 357-4886.

Hirshhorn Museum and Sculpture Garden
Directions: Mel Chin (through April 23) Sculptures, mixed-media installation.
Gerhard Richter (through February 12) Eighty paintings, objects, photographs by the contemporary German artist.

National Museum of American History
The Ceremonial Court (opens late February) Permanent installations re-create White House spaces from 1902 to the present.
The American Presidency, 1789-1989 (through June) More than 400 objects and photographs.

National Air and Space Museum
Focus on Flight (through April) Forty photographs from the NASM contest.
A Search for Planets (February 8; 7:30 P.M.) Bruce Campbell on recent research.
Dallas to Madrid: Reflections of a Black Airline Pilot (February 21; 7:30 P.M.) Boeing 767 pilot David Harris.

Cooper-Hewitt Museum (New York)
Enamel Signs (through April 9) More than 80 European placards promoting everything from autos to chocolate.
Purses, Pockets, Pouches (through March 5) Textile offerings, from 17th to 20th centuries.

Renwick Gallery
Stephen de Staebler: The Figure (through February 12) Thirty-five clay and bronze life-size sculptures.

Exhibition catalogs

Catalogs available currently include:
Flowers from the Royal Gardens of Kew (paper, $15.95)
Perpetual Motif: The Art of Man Ray (paper, $25.95; cloth, $55)
Gerhard Richter: Paintings (paper, $24.95)
Rome and the Germans as Seen in Coinage (paper, $15.95)

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Here at the Smithsonian: Three-minute presentations take you behind the scenes. To find out what stations in your area carry these radio and TV programs, write: Office of Telecommunications, MAH Room BB40, Washington, D.C. 20560.
Smithsonian World: The new season continues with "The Vever Affair," the tale behind Henry Vever's long-lost collection; March 1, 8 P.M. Check local PBS listings.

Lecture and Seminar Program

For further information on offerings around the country, write to the Lecture and Seminar Program, 1100 Jefferson Drive S.W., Room 3045, Washington, D.C. 20560, (202) 357-1350.

Resident Associate Program

To become a Resident Associate, or for fee and ticket information, call 357-3030.
Speak of Me As I Am! (February 18; 7:30 P.M.) A multimedia salute to Black History Month with music, dance and poetry.
In Search of Sisterhood (February 8; 7 P.M.) Author Paula Giddings on the history of America's largest black sorority.
Reflections on Jazz and Blues (February 12; 4 P.M.) Amiri and Amina Baraka on the roots of modern music.

Smithsonian Institution Traveling Exhibition Service

SITES organizes and circulates exhibitions to cities throughout the United States and abroad. To sponsor a show in your community, write SITES, Smithsonian, Washington, D.C. 20560. Here are some February exhibits:
Boise, Idaho (February 25-April 9) *Superman: Many Lives, Many Worlds*, Boise Art Museum.
Boston, Massachusetts (February 11-March 12) *Field to Factory: Afro-American Migration, 1915-1941*, Boston National Historical Park.
Grand Rapids, Michigan (February 11-March 12) *Steichen and His Men: A Photographic Portrait of World War II*, Gerald R. Ford Museum.
Jacksonville, Florida (February 18-March 19) *Vietnam Veterans Memorial: A National Experience*, Jacksonville Museum of Arts and Sciences.

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Blooming beauties from Britain

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The hard-won specimens soon appeared in the pages of his *Botanical Magazine*, its exquisite color plates and informative text anticipated keenly and cherished by nurserymen, gardeners and collectors throughout the land. Curtis, a Quaker of simple tastes, also loved homely English favorites. His readers were likely to find a daisy and a South African bird-of-paradise accorded equal honors.

"Flowers from the Royal Gardens of Kew," at the National Museum of Natural History, pays tribute to Curtis and his successors on the occasion of the publication's 200th birthday. Rechristened *The Kew Magazine* in 1981, and produced under the auspices of the Royal Botanic Gardens, the periodical is the oldest continuously published, color-illustrated scientific journal.

The drawings, produced by generations of peerless botanical artists, have remained a hallmark. In Curtis' day, some 30 women and children hand-colored each engraving in every issue. Eventually, engravings gave way to lithographs, but the practice of hand-layering tints endured until 1948.

As collectors of every bent ranged from North America to India and beyond, the quarterly has continued to introduce stunning finds to the world—and to cultivation.

The catalog, reproducing 48 of the show's 70 watercolors (culled from the massive collection at Kew Gardens), will solace gardeners waiting out the snowy stretch to spring.

Organized by curator Ruth Stiff, the exhibition continues at NMNH through April 30 and then moves on to New York, St. Louis and Chicago.

Kathleen M. Burke

Lilian Snelling's watercolor, 1931, records tulip species from Turkestan.

Pandora Sellars painted jack-in-the-pulpit from Nepal, 1982.

Water lily, done by Sydenham Edwards, 1809, is a pink form native only to India and characterized by scalloped leaves.

Stella Ross-Craig drew amaryllis hybrid, the first ever developed, in a watercolor rendering, 1948.

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Domestic Study Tours

Sojourn in Tucson *April 1-8 or 15-22*: Folklore and natural history.

NEW Charleston and Savannah *April 2-9*: History, homes and gardens.

NEW Renaissance Miami *April 5-10*: Culture, art and architecture.

Delta Queen *April 6-14*: Mississippi steamboat journey from New Orleans to Memphis.

Spring Gardens *April 30-May 7*: From Washington, D.C. to Wilmington, Delaware.

Okefenokee *May 2-7*: Canoe through scenic wildlife refuge; for novice or expert.

Southwest Indians *May 4-14*: Hopi and Navajo from Phoenix to Santa Fe.

NEW Brooklyn with a Bang *May 25-28 or September 14-17*: Architecture, art.

Sanibel-Captiva *May 28-June 3*: Flora and fauna on Florida's Gulf Coast.

NEW Detroit Auto Barons *June 8-11*: Visit estates of Ford, Fisher and Dodge.

Alaska Landscapes *June 20-July 2 or July 25-August 6*: Denali National Park and more.

Grand Canyon *July 1-10*: Raft down the magnificent Colorado.

Pueblo Indians *July 9-16*: Based in Santa Fe; concludes with an annual crafts fair.

Yosemite *July 13-22*: Easy naturalist-led hikes through spectacular scenery.

Salmon River *July 18-26*: A raft trip that combines camping and a lodge visit.

Sojourn in Santa Fe *July 23-30*: Study historic and contemporary Hispanic culture.

Alaska Cruise *August 12-23*: Explore the Inside Passage aboard an expedition ship.

Foreign Study Tours

People's Republic of China Ten tours in 1989 for new and repeat travelers.

NEW Jamaica *February 26-March 8*: Customs, culture, visual and performing arts.

Zapotec and Maya Mexico *March 2-14*: Southern Mexico culture, archaeology.

Kyoto *March 26-April 4*: History, art and culture. Includes Nara.

NEW Atlantic Passage—origins of trade and settlement in the Americas *April 10-26*: Cruise from the Caribbean to West Africa.

NEW Gardens of Northern Italy *April 12-23*: Private gardens at Lake Maggiore, Verona.

Berlin *April 12-26*: Also features Dresden, Wittenberg, Weimar.

European Countryside Programs *May-September*: Relaxing sojourns in Hungary, England, Austria, France, Italy, Switzerland, West Germany or Wales.

NEW Botswana-Zimbabwe *May 9-26*: Includes Victoria Falls and Okavango Delta.

USSR-Golden Ring *May 20-June 3*: Study ancient Russian culture.

Danube Voyage *May 23-June 9*: Art and history from Romania to West Germany.

NEW Cotswold Walks *May 25-June 6*: A variety of walks through the English countryside.

Central Asia *May 27-June 8 or September 16-29*: From Leningrad, fly to Samarkand and Bukhara. Ends in Moscow.

Florence Seminar *May 27-June 11*: Classes and excursions based in a villa-hotel.

Greece *May 29-June 12*: History and art from Thessaloníki to Athens.

Odyssey of Flight *June 2-13*: Paris Air Show and 45th anniversary of D-Day.

Highlands of Scotland *June 2-18*: Culture and natural history.

NEW Turkey's Eastern Reaches *June 7-24*: East from Ankara to the ancient Orient.

NEW Gardens of Brittany and Normandy *June 10-23*: Includes Paris.

British Isles Voyage *June 16-July 3*: Remote hamlets and islands aboard the *Argonaut*.

Cave Art in France and Spain *June 19-July 4*: Basque coastlines, the Pyrenees, Dordogne.

Swiss Countryside Walks *June 21-July 6*: Moderate or challenging day hikes.

NEW Canada-St. Lawrence *June 22-July 3*: Montreal, Quebec, Toronto as well as a cruise on the *Canadian Empress*.

Scotland by Train *July 1-14*: Skye, Glasgow, Edinburgh, Inverness, the Highlands.

NEW England for Families *July 10-20*: Storybook London and the Cotswolds for families with children, grandchildren (ages 7-14).

Iceland *July 22-August 6*: Circle the island, study natural history, geology.

Baltic Passage *July 28-August 12*: Cruise to Denmark, Sweden, Finland, Leningrad.

NEW Lena River USSR *July 28-August 16*: Exclusive cruise through Siberia.

Smithsonian Seminars

Join fellow Associates who share your special interests at in-depth seminars with Smithsonian curators and guest experts.

The Broadmoor
Colorado Springs, *February 22-25*
Learn about aviation history during lectures and visits to the Air Force Academy and NORAD, or study American popular song in spectacular surroundings at the base of the Rockies.

Mohonk Mountain House
New Paltz, New York, *April 2-7*
Enjoy a fascinating look at Victorian art and architecture and visit sumptuous Hudson River valley homes, or study the creation myths of the ancients—from Mesopotamia to Maya Mexico—at this unique, lakeside 19th-century resort.

Washington, D.C. *April 19-21*
Study Persian and Islamic art and see the Sackler Gallery's special exhibition "Persian Art and Culture in the Fifteenth Century." Or, learn about American coins and currency during a visit to the Smithsonian's National Numismatic Collection.

Write to Smithsonian National Associate Program, Washington, DC 20560 or call (202) 357-4700 for tour brochures, (202) 357-1350

Research Expeditions

Contribute your time, talent and financial resources to Smithsonian research. Work with curators at Washington, D.C. museums and archives, or at field sites around the country and the world.

Spanish Mission Archaeology
Gainesville, Florida
February 19-March 3
Survey 17th-century building remains and excavate both Hispanic and Indian artifacts from a Franciscan mission site.

Competition in the Forest
Front Royal, Virginia
March 11-25 and June 3-17
Track, observe and record the behavior of mammal and bird populations at the Smithsonian's Conservation and Research Center.

Dynamics of an Active Volcano
Costa Rica, *April 1-13*
Monitor Arenal Volcano's eruptive activity and study the effects of volcanism on the surrounding vegetation.

Documenting Our Veterans Memorials
Washington, D.C. *May 24-June 7*
Join with Smithsonian photographers to record Memorial Day ceremonies at the Vietnam Veterans Memorial and other military monuments.

American Sculpture Inventory
Washington, D.C. *June 4-16*
As you survey statuary and relief works in the nation's capital, help establish the first nationwide survey of American sculpture.

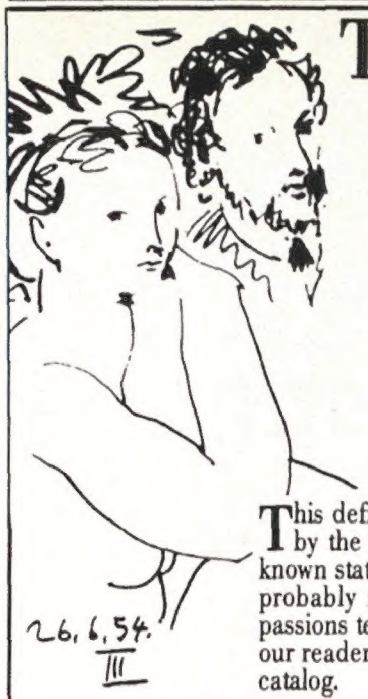
British Enterprises in the New World
London, *June 18-30*
Conduct research on Caribbean colonization in London's libraries and museums for a new Smithsonian exhibition.

Creating Aerospace Curricula
Washington, D.C. *July 9-21*
Teachers (K-12) write innovative curricula for national distribution.

Air and Space Archival Treasures
Washington, D.C. *July 23-August 4*
Help archive historic documents and films at the Air and Space Museum and at the Paul E. Garber Facility.

The Horse in Crow Indian Culture
Billings, Montana, *August 15-22*
Photograph, interview and record the annual Crow Fair festivities along the Little Bighorn River.

for seminar and expedition brochures.



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By Beth Py-Lieberman

Did Washington plant my relative's cane?

I am related to a man who once knew a man who knew another man who knew George Washington. And to prove it, my family has a souvenir of the great relationship between the first President and that friend of a friend of my now departed relative.

It seems that when Washington was feeling pressed by affairs of state, he would drive out from the then capital city of Philadelphia and visit Belmont, the home of Judge Richard Peters. "There, sequestered from the world, the torments and cares of business, Washington would enjoy a vivacious, recreative, and wholly unceremonious intercourse with the Judge," writes historian Henry Simpson in his voluminous *The Lives of Eminent Philadelphians, Now Deceased.*

According to Simpson and my relative, one Henry Hoppin of Lower Merion, Pennsylvania, Belmont was also home to a grand old chestnut tree planted by Washington himself. Using wood taken from that tree after it died in the 1860s, Hoppin and his friend John Levering carved four walking sticks. In a letter written around 1876, Hoppin, a prudent man, carefully documented the facts relating to his two souvenirs of the President and the tree from which they were carved.

Hoppin's letter tells the story of the planting of the tree, as told to him by Levering, who was old enough to have known Judge Peters. "Washington and the Judge had been dining together and walked out, the General putting some chestnuts in his pocket after dinner. . . . The Judge, leaning upon his cane, made a hole in the ground which, being noticed by Washington, he placed a chestnut in the hole, it took root and grew and was carefully watched and guarded by Judge Peters and highly valued by him."

The cane hangs now in an in-law's home (if truth be told, my relationship to Hoppin is rather tenuous). But nonetheless, it was with a certain awe that I first regarded the cane; it was a bond that linked me, however remotely, with the great man.

That feeling remained until a few months ago when I happened on a book called *George Washington Slept Here* by Karal Ann Marling. Canes and other relics dating back to the time of Washington, it would appear, are fairly common, not to say outright plentiful. Apparently, too, whenever George Washington ate off of, drank from or slept on something, the table, glass or blanket was instantly whisked away by somebody and stored as a memento for future generations. During the nation's 1876 Centennial celebration a mad rush set in to trace or dig up and somehow validate anything that could possibly be linked to Washington. If a grandmother was said to have danced with him, her ball gown was dusted off and treasured because it had once been pressed close to the great general's stalwart chest. Gloves worn on hands that had reputedly touched President Washington's were stored away in hope chests. Some Americans treasured bricks from his birthplace at Wakefield, in Virginia, others hoarded wineglasses, cutlery or china that he once dined from. And, oh yes, putative locks of his hair, enough to fill a good-sized barbershop, began turning up everywhere.

To my chagrin, it also seems that the poor man never went anywhere without planting a tree—or just pausing for a moment beneath one. And every time he did so, apparently, a legion of admirers took note and recorded it for posterity. Washington was, of course, a formidable tree planter. His diaries contain some 10,000 words relating to his penchant for planting: "Saturday, 5th. Planted out 20 young Pine trees at the head of my Cherry Walk" or "28th. I planted three french Walnuts in the New Garden and on that side next the work House." He brought trees in from the forests and had them transplanted on the grounds of Mount Vernon.

Perhaps it was his admiration for beautiful trees that led him, as legend has it, to stand ceremoniously beneath the branches of a stately elm in Cambridge, Massachusetts, on July 3, 1775, the day he took command of his army. The tree that came to be known as the Washington Elm lived until 1923, becoming almost as famous as the President. Its seedlings were transplanted as far west as Seattle. And from one of its huge branches, which blew down sometime before the Philadelphia Centennial Celebration, a man from Milwaukee commissioned the carving of an ornamental chair, as well as quite a number of wooden goblets, urns, vases and, of course, canes.

Washington was and is an American idol revered so deeply and for so long that where he is concerned our collective imaginations have happily blurred fact and fantasy. Maybe old Henry Hoppin was swayed in that way. But then again, maybe not. I'd like to think that on that cold wintry day, Grandpa Hoppin and his old friend John Levering *did* drive quietly out to Belmont and cut from the historic chestnut tree enough wood to carve a few souvenirs. Perhaps they stood there a moment longer, beneath its sagging branches, to bid the tree farewell before getting into their carriage for the drive home.

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